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AN ECONOMIC AND ENGINEERING ANALYSIS OF A SELECTED
FULL-SCALE TROMMEL SCREEN OPERATION

Final Report

By
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Douglas E. Fiscus
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October 1983

Work Performed Under Contract No. AC03-80CS24330

Midwest Research Institute
Kansas City, Missouri

Technical Information Center
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United States Department of Energy

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FINAL REPORT

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Work Performed Under Contract No. DE-AC03-80CS24330

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For

Conservation and Solar Applications Division
Department of Energy
San Francisco Operations Office
1333 Broadway
Oakland, California 94612

Attn: Mr. William Lambert
Program Coordinator

PREFACE

Midwest Research Institute (MRI) assisted by Cal Recovery Systems, Inc. (CRS) as a subcontractor has conducted a program entitled "An Economic and Engineering Analysis of Selected Full-Scale Rotary Screen Operations." The evaluation of the rotary screen (trommel) was conducted at the Baltimore County Municipal solid waste facility in Cockeysville, Maryland, and was sponsored by the Department of Energy (DOE) under Contract No. DE-AC03-80CS24330.

This document is the final report and is for the period August 1, 1980, through November 26, 1982, according to the directive of the Program Coordinator.

MRI personnel contributing to this program include Mr. Douglas E. Fiscus, Head, Applied Sciences Section, Mr. G. Joe Hennon, Program Manager, Applied Sciences, who served as Project Manager, Mr. Gary Hinshaw, Junior Chemist, Mr. Patrick Hogan, Assistant Engineer, Mr. Gary Kelso, Senior Chemical Engineering Economist, and Ms. Karin Bauer, Associate Statistician. CRS personnel participating in the program were Mr. George Savage, Mr. Daniel Jones, Mr. Donald Lafrenz, and Dr. John Glaub.

Approved for:

MIDWEST RESEARCH INSTITUTE

L. J. Shannon, Executive Director
Engineering and Applied Sciences
Division

October 1983

ABSTRACT

The trommel screen located at the Baltimore County municipal solid waste processing plant operated by Teledyne National was evaluated for a 1-year period. This trommel is used to remove noncombustibles from refuse derived fuel (RDF) and thereby reduce ash content and increase heating value of the RDF. The trommel is 8 m in length, 3.7 m in diameter, has 32-mm holes, and can be operated at 6 to 12 rpm. Economic operating and maintenance data were collected for the period November 1980 through October 1981. Trommel performance was measured during October 1980 and January, May, and August 1981 in order to determine performance during the four seasons of the year. Test runs were conducted to evaluate screening performance as a function of feedrate and rotational speed.

Physically, the trommel can convey infeed rates as high as 46 Mg/h, but screening efficiency decreases with increased feedrates. An infeed range of 7 to 13 Mg/h is practical as this insures the greatest probability of meeting fuel specifications and achieving optimum economic contribution. While high screening efficiencies can be achieved at low feedrates, the value of the heating value increase may not always offset the trommel cost below a feedrate of 5 Mg/h.

The effect of rotational speed is not pronounced because of the effect of lifter bars inside the trommel which tend to lift the material to the same height before dropping, regardless of rotational speed. The trommel removes both ash and moisture from the RDF because the undersize material has higher contents of both. Therefore, the heating value and organic content of the fuel is improved and the amount of improvement tends to decrease with increasing feedrate. Fuel quality improvements are achieved by removing a significant amount of the undersize, which contains much combustible material. Therefore, consideration needs to be given to further processing of the undersize.

Seasonal variations occurred in the feed to the trommel, for example as a consequence of the higher percentage of lawn and garden waste present in spring and summer. Seasonal variations were manifested in varying particle size, ash content, moisture content, organic content, and heating value. However, no obvious trend of trommel performance versus season of the year was observed.

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1.0 INTRODUCTION

1.1 BACKGROUND

The combined need for new waste disposal techniques and new energy sources has stimulated considerable interest and activity in the design and construction of waste-to-energy processing plants. A 1978 MRI survey listed over 50 existing or planned systems for the recovery of energy and other materials from municipal solid wastes (MSW). Plants which produce refuse derived fuel (RDF) were among the common types of waste processing plants identified.

Prior to this program, governmental agencies had funded numerous studies of solid waste processing facilities and related facets of the solid waste industry. These studies revealed that no standards had been developed and accepted for plant design, processing flow diagrams, processing equipment selection, and material handling equipment. There were no duplications of plant type and equipment either in operation or being planned. However, problems common to all plants were high operation and maintenance costs, concerns about waste fuel quality, and the need to remove dangerous and hazardous material from the incoming waste stream. Size reduction and separation of various components in the MSW stream are necessary to produce RDF from MSW. Rotary (trommel) screens may be used to aid resource recovery in all of the above listed areas.

The use of trommel screens had been shown to be valid in several resource recovery plants. However, additional research and development work was needed in order to quantify the important engineering parameters. The general objectives of this project were to thoroughly evaluate a full-scale rotary screen and to present the results so that plant designers, plant operators, and decision-makers will have the best available data on design considerations, construction, and operating parameters of rotary screening systems presented in a concise and understandable manner.

1.2 DISCUSSION OF ROTARY SCREENS

Screens are used to extract particles within a specific size range from an MSW stream. Screens represent a type of separation equipment by which the MSW is segregated by particle size only, instead of by density and particle size as with an air classifier. The screen can be placed anywhere in the sequence of processing steps used for energy and resource recovery; it can be the first piece of equipment, or it can be installed after the shredders or air classifier. For example, a screen may be used to eliminate glass, metals, etc. before size reduction takes place, or it may be used to remove fine material after primary and/or secondary shredding. The need to reduce the amount of ash when RDF is burned has increased the interest in using rotary screens for glass, grit, and metal removal.

There are three types of dry screens used in MSW-to-energy systems: vibrating, disc, and rotary (trommel). Vibrating screens are further divided into gyrating and reciprocating. As stated above, the separation accomplished by screens is based on particle size. The openings allow particles smaller than the size of the openings to pass through. The material which passes through the holes is called "unders." The material which does not pass through the holes flows out the end of the screen as "overs." The motion of the screen (in the case of rotary screens, the unit rotates about the central axis of the cylinder) serves three purposes: (a) it allows the particles to come in contact with the screen surface; (b) it minimizes entrapment of small particles; and (c) it aids in moving the MSW down the screen. The screens are generally set at an angle so gravity can also assist in moving the MSW along the length of the screen.

The rotary screen, called a trommel, illustrated in Figure 1.1 is a long metal cylinder with holes in the outer surface. The cylinder is supported on external bearings to maintain a clear area inside the cylinder. The trommel is rotated by a motor at one end.

Despite the fact that trommel screens have been built and placed in several operating plants, the principles governing trommel screens when MSW is being processed are not well understood. Because designs have been based on limited testing of small-scale units and not on fundamentals verified by large-scale test results, the scale-up and subsequent operation often lead to less than optimum performance.

This program addressed the issue of evaluating and characterizing a rotary screen as a unit operation in the resource recovery process.

All trommel screens presently in processing facilities are of basically the design that is illustrated in Figure 1.1. The details of the designs vary to suit the specific separation desired. Screen hole size is selected to control the maximum size of the material removed as unders. Some designs use blades called lifters on the inside surface of the trommel to assist in agitating the material. The inclination of the trommel is used to help control the material throughput rate and therefore the length of time the material is exposed to the holes in the screen surface.

Rotary screens placed after shredding or air classification can take advantage of the more uniform size distribution of the material. The openings in the trommel screen can be smaller.

The characterization parameters derived from this study will aid the ultimate comparison of rotary screens of various designs used in different steps of a resource recovery process. This information will also aid in elucidating the fundamentals governing rotary screen performance.

Figure 1.1. Trommel (Rotary Screen).

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2.0 CONCLUSIONS AND RECOMMENDATIONS

2.1 CONCLUSIONS

- The trommel hole size and configuration and the trommel inclination were fixed parameters. Variation in these parameters would undoubtedly affect absolute test values at a given feedrate and trommel rotational speed. However, it is believed that the general relationships pointed out in this section would hold true over the ranges in which the hole size, hole configuration, and trommel inclination would vary in normal operations.
- Trommel screening efficiency decreases as feedrate increases. Although there is considerable data variability, the trend is generally linear. Screening efficiencies as high as 90% and above can be achieved at very low feedrates, and generally screening efficiency is greater than 80% at a feedrate less than 9 Mg/h for the screen tested in this work.
- Screening efficiency generally increases with rotational speed (to an upper limit) although the rotational speed effect is not pronounced at lower feedrates because of the lifter effect. The Baltimore County trommel has lifters which tend to raise material to approximately the same height irrespective of rotational speed.
- The trommel removes both moisture and ash because the undersize material is higher in these constituents. Moisture content and ash content removal decreases with increasing feedrate because of the decreased screening efficiency and consequently the greater carry-over of the fines with the oversize material.
- Heating value improvement decreases with increasing feedrate because of decreased ash removal. However, heating value is increased at the expense of losing heat energy with the undersize material. Energy recovery in terms of the energy in the oversize recovered from what is available in the feed increases with feedrate because screening efficiency is lower and less heat energy is removed with the undersize.
- Organic content correlates with heating value and, therefore, to feedrate. Since few plants have the capability to measure heating value, organic content may be used as a field measure for evaluation of screening performance where a fuel product is being produced.

- Seasonal variations were present in the trommel infeed. During the summer test period, the infeed had the smallest particle size and the highest moisture content due to the larger percentage of lawn and garden waste in the MSW. Data variability was large enough that no conclusions could be drawn concerning trommel performance versus season of the year.
- Under proper operating conditions (when the feedrate is not too high) the trommel in most cases removes noncombustibles sufficiently to reduce ash content and to increase heating value to meet the dry basis fuel specification of 15,120 kJ/kg (6,500 Btu/lb) and 15% ash.
- Trommel costs including capital depreciation, operation and maintenance, materials and labor, power, and all overhead costs were \$17,809 for the year. The trommel was operated for 2,906 h, yielding an average cost of \$6.13/h. Because the pellet system average capacity was much less than the trommel capacity, a dollars per hour value is a better ratio for comparison.
- Except at very low flow rates the trommel has a net positive economic impact when calculated on the basis of the dollar value of the heating value increase less trommel costs. An optimum feedrate is not clearly defined, but keeping feedrates within a 7 to 13 Mg/h range insures optimum economic contribution, which averages \$6.26/Mg for this infeed range.
- Physically, the trommel can handle feedrates as high as 40 Mg/h. The maximum tested was 46.6 Mg/h at 12 rpm. However, at the higher feedrates the trommel tends to act more as a conveyor and less as a screen because of the increased bed depth. Feedrates are dependent on the desired objective. To maximize energy recovery, high feedrates should be used. To maximize screening efficiency, low feedrates should be used. Plant experience has been to operate within a range of 7 to 13 Mg/h. Test results tend to support this experience. The plant objective is to meet fuel specifications. While limiting feedrates will not necessarily guarantee those fuel specifications are met, operating at no more than 13 Mg/h will increase the probability of meeting them.

2.2 RECOMMENDATIONS

The Baltimore trommel design is adequate to meet the ash removal needs of the dRDF fuel specification. However, the trommel does so by removing a significant amount of undersize material. Within the normal operating range of 7 to 13 Mg/h, the undersize averaged 46% by weight of the infeed. Smaller screen hole sizes could probably be used to reduce the amount of undersize, and still meet the 15% dry basis ash fuel specification. The optimum hole size, however, cannot be determined from the data in hand. Alternatively, it is recommended that consideration be given to further processing of the trommel undersize to recover usable material.

3.0 SITE AND FACILITIES DESCRIPTION

3.1 GENERAL FACILITY DESCRIPTION

The address of the Baltimore County MSW processing plant is 10320 York Road, Cockeysville, Maryland 21031. The plant telephone number is (301) 628-1130 or 1135, and the plant manager is Mr. Ken Cramer. The plant is operated by Teledyne National for Baltimore County in conjunction with the Maryland Environmental Service. The plant receives MSW from the surrounding area which is then processed into refuse derived fuel (RDF) or densified refuse derived fuel (dRDF). Figure 3.1 is a schematic diagram of the plant.

Figure 3.2 is a general view of the facility as seen from the west and south. The large door openings give access to the storage pits where MSW is received. The rectangular structure at the north end of the building, with the piping connected to it, is the baghouse for the dust collection system. The open structure on the east side of the building is the magnetic separator system. The first building south of the main building houses the maintenance and parts area.

The plot plan for the complete facility is shown in Figure 3.3. The operating part of the facility utilizes 7,580 m². Figure 3.4 of the MSW processing facility and Figure 3.5 of the RDF processing facility are pictorial flow diagrams.

Incoming commercial loads of MSW are weighed before they go to the pit area. Citizens bringing in small quantities of waste deposit it in open-topped trailers at the facility entrance. When the trailers are full, they are weighed at the scales before being dumped into the holding pit or the push pits.

The pit area is made up of a holding pit with two movable bridges giving access to the four push pits. The material dumped into the holding pit is later transferred into the push pits by a grappling crane which can travel over the entire pit area.

Each line operator sits in an enclosure built into the wall that divides the storage area and the shredder room. From this vantage point the operator can control the flow of material into each shredder. Small grapples are used to mix the material in the push pits before feeding it into the shredder.

The two processing lines are identical through the magnetic separator system; therefore, in the following description the conveyor numbers for the first processing line are used.

Figure 3.1. Schematic Diagram of the Baltimore County Solid Waste Processing Facility.

Figure 3.2. General View of the Baltimore County Solid Waste Processing Facility.

Figure 3.3. Plot Plan - Baltimore County Solid Waste Processing Plant.

Figure 3.4. Flow Diagram for Receiving Through Ferrous Recovery, Baltimore County.

Figure 3.5. Flow Diagram of RDF Processing, Baltimore County.

The material is transported from the push pits to the shredder inputs by drag conveyor 2. The shredders (Figure 3.6) are Tracor Marksman Model 860, 45.5 Mg/h (50 ton/h) units driven by 1,000 hp, Toshiba reversible electric motors directly coupled to the rotor shaft. The shredders are equipped with a Fenwal explosion suppression system.

The shredded MSW is carried to the elevated magnetic separation system (Figure 3.7) on belt conveyor 7. The nonmagnetic material drops onto belt conveyor 8 and eventually into the RDF processing building.

The recovered magnetic material is transported to the output chute by belt conveyor 9. This chute collects the material from both magnetic separators and empties it into an open-topped trailer. Figure 3.8 is a view down belt conveyor 4, which is carrying a typical load of ferrous metal. Belt conveyor 10 carries the rejected material to belt conveyor 11, which combines the material from both streams for further processing. Belt conveyor 11 is reversible to allow bypassing the processing building by feeding into the open-topped trailer shown in Figure 3.9. Belt conveyor 11 normally feeds the short horizontal belt conveyor 12. The material is then transported via belt conveyors 13 and 14 into the processing building.

At the intersection of belt conveyors 14 and 15, there is a power-operated diverted blade (Figure 3.10) which directs the flow onto belt 15 or into the compactor hopper.

The RDF processing is monitored and controlled at the panel shown in Figure 3.11. The TV screens are used to monitor six critical locations and to provide visual confirmation of parameters and safety.

Belt conveyor 15 empties into the air classifier, which uses two fans to pull off the lighter (mostly combustible) part of the shredded MSW. The light material is then collected in two cyclone separators and fed through air locks onto belt conveyor 19 (Figure 3.12). Belt conveyor 20 carries this material into the trommel where the fine material (mostly glass and dirt) is removed.

The heavier part of the infeed to the air classifier drops out of the bottom onto belt conveyor 16, then to 17 and 18, and then into a truck for hauling to the landfill.

Since the air classifier operation has the greatest effect on the trommel infeed composition, the air classifier is shown in detail in Figures 3.13 and 3.14.

Figure 3.15 shows the layout of the RDF 34.1 x 22.2 m (112 x 73 ft) processing plant, and Table 3.1 is a list of the major equipment in the RDF building.

Figure 3.6. Background: Primary Shredder and Inclined Drag Conveyor to Shredder,
Foreground: Grate Bars and Hammers, Baltimore County.

Figure 3.7. Magnetic Separator System, Baltimore County.

Figure 3.8. Output Belt, Magnetic Separator, Baltimore County.

Figure 3.9. Output Chute for Rejects, Faltimore County.

Figure 3.10. Diverter Blade System, Baltimore County.

Figure 3.11. RDF Processing Line Control Panel, Baltimore County.

Figure 3.12. Belt Conveyor 19 - Trommel in Background, Baltimore County.

Figure 3.13. Air Classifier Details, Baltimore County.

Figure 3.14. Air Classifier Airflow Diagram, Baltimore County.

Figure 3.15. RDF Plant Layout, Baltimore County.

TABLE 3.1. LIST OF EQUIPMENT

Item	Quantity	Description	Motor hp	Manufacturer
1	1	Air classifier feed conveyor, 48 in. x 78 ft	5	
2	1	Air classifier		Montgomery Industry/NRRC Design
3	1	Heavies conveyor 1, 48 in. x 14 ft	7.5	Iron Hustler
4	2	Primary cyclone, 12 ft $\emptyset$ with rotary airlock 4 x 4 ft	7.5	Goodhart Sons, Inc.
5	2	Air classifier fan No. 90	135	Netzer Metalcraft
6	1	Trommel feed conveyor 1, 48 in. x 27 ft	3	Dixie Manufacturing
7	1	Trommel feed conveyor 2, 48 in. x 15 ft 6 in.	2	Wallace
8	1	Trommel, 12 ft $\emptyset$ x 28 ft	10	Wallace
9	1	Trommeled RDF conveyor, 48 in. x 45 ft	5	Triple S
10	1	Heavies conveyor 2, 48 in. x 71 ft	20	Wallace
11	1	Heavies conveyor 3, 48 in. x 39 ft 6 in.	10	Iron Hustler
12	1	Heavies conveyor 4, 48 in. x 53 ft	5	Iron Hustler
13	1	Williams secondary shredder feed conveyor, 48 in. x 40 ft	5	Goodhart Sons, Inc.
14	1	Secondary shredder model 580 reversible	800	Design Systems
15	2	Secondary cyclone, 10 ft $\emptyset$ with rotary airlock, 4 x 4 ft	5	Williams
16	2	Secondary shredder fan No. 80	75	Goodhart Sons, Inc.
17	1	Pellet mill feed surge bin with live bottom	7.5	Dixie Manufacturing
18	1	Surge bin feed screw, 20 in. $\emptyset$ x 20 ft	5	Screw Conveyor
19	1	CPM pellet mill model 8162-3	200	Wallace
			12.5	California Pellet Mill

(continued)

TABLE 3.1 (continued)

Item	Quantity	Description	Motor hp	Manufacturer
20	2	Sprout Waldron pellet mill model 26-300	300 5	Sprout Waldron
21	1	Sprout Waldron pellet mill discharge conveyor, 12 in. x 7 ft	0.5	Hytrol
22	1	Pellet screw, 20 in. $\emptyset$ x 33 ft	5	Wallace
23	1	Pellet loading conveyor, 18 in. x 48 ft	5	
24	1	Gruendler secondary shredder model 56x40	360	Gruendler
25	1	Gruendler secondary shredder fan No. 60	60	Dixie Manufacturing
26	1	RDF stationary packer HTP-1000	60	Heil
27	2	Landfill stationary packers HTP-1000	60	Heil
28	1	Jet air fan (A/C) No. 40	40	Montgomery Industry
29	1	Dust collector model JA-1296-D	15	Griffin Environmental
30	1	Dust collector fan 100,000 cfm No. 608	250	New York Blower

3.2 TROMMEL DESCRIPTION

The purpose of the Baltimore trommel is to "clean up" air classified RDF by removing fine material that is composed largely of small pieces of glass, metal, stones, dirt, sand (i.e., grit). Sixteen tests of the Baltimore air classifier¹ showed that 14 mesh grit in the air classifier lights, which is the trommel screen infeed, ranged from 14 to 32% with the average being 20%. To reduce wear on the pellet mill, it is well to remove this material before secondary shredding and pelletizing.

Figure 3.16 lists the specifications of the Baltimore trommel. Figure 3.17 is a layout of the trommel showing the lifter distribution. This unit is a single function trommel; that is, the trommel has only one set of hole sizes and is used only to remove fines. Thus, there are only three material flow streams of interest.

- Infeed - Air classified RDF
- Undersize - Reject material
- Oversize - Infeed to the secondary shredder and pellet mill

Figure 3.18 is a pictorial view of the trommel showing the infeed and output conveyors. The trommel undersize falls directly onto belt conveyor 17, which was shown in Figure 3.5, and is mixed with the air classifier heavies. The trommel oversize are conveyed by belt conveyor 21 to the pelletizing operation composed of the secondary shredder and pellet mill (Figure 3.19). Figure 3.20 of the interior of the empty trommel shows the lifter bars and some hole pluggage. Figure 3.21 shows the tumbling action of the material when the trommel is operating.

3.3 TROMMEL VARIABLES

The trommel hole size is fixed at 31.8 mm (1-1/4 in.). The plant operators have considered using a smaller hole size, but the construction of the unit makes it impossible to readily change hole sizes in the field. Thus, field tests were restricted to one hole size.

The slope of the trommel is fixed at 3 degrees, and because of the underneath trunnion drive, it is not possible to readily change the slope in the field. Therefore, field tests were restricted to one slope.

Due to the fact that the trommel drive motor is fitted with a variable pitch V-belt sheave, rotational speed adjustments can be made in the field. The variable range is 6 to 12 rpm. The trommel diameter is 3.7 m (12 ft). The rpm range then corresponds to a circumferential speed of 69 to 138 m/min (226 to 452 ft/min).

BALTIMORE TROMMEL

SPECIFICATIONS

Size

Total Length: 8.0 (26.3 Ft.)
Perforated Length: 7.4 m (24.3 ft)
Diameter: 3.7 m (12 Ft.)
Hole Diameter: 32 mm (1.25 In.)
Effective Hole Area: 39.62 m (61,408 in.²)
Lifter Configuration: 9 Lifters, 3.05 m long x 30.5 cm high (10 Ft. x 12 In.); parallel to Q_L , equally spaced circumferentially, & alternately placed at upper & lower ends

Drive

Motor: 7.5 kW (10 HP), 230/460 V, 26.8/13.4 A, 60 HZ, 3 phase
Rotational Speed: Variable 6 to 12 RPM
Description: Drive motor has variable pitch V-belt sheave. Trommel rotated by trunnions located underneath the trommel.

Figure 3.16. Specifications of Trommel Screen at Baltimore County.

CIRCUMFERENCE OF TROMMEL LAID FLAT TO SHOW LIFTER BAR ARRANGEMENT

Figure 3.17. Trommel Lifter Bar Arrangement, Baltimore County.

ROTARY SCREEN SYSTEM
BALTIMORE COUNTY, MARYLAND

Figure 3.18. Trommel Flow Diagram, Baltimore County.

Figure 3.19. Pellet Mill and Trailer Being Loaded with Pellets, Baltimore County.

Figure 3.20. Interior of Trommel, Baltimore County.

Figure 3.21. Interior of Trommel at 10.6 Mg/h Infeed Rate and 6 rpm, Baltimore County.

The trommel is adjusted by the plant operators for individual production requirements. The trommel is normally operated at 6 rpm and a relatively light infeed rate is required to feed the pellet mills. The lower trommel rpm is selected to reduce trommel drive wear.

The trommel variables therefore are:

- Rotational speed - 6 to 12 rpm
- Infeed flow rate - 0 to maximum Mg/h

For any trommel, the question of critical speed is of concern. Particles inside a trommel are subjected to centrifugal force, defined as follows.

$$F_c = \frac{W \omega^2 r}{g \cos \beta}$$

where,

F_c = centrifugal force - N (lb)

W = weight of particle - N (lb)

W_r = radial component of particle weight

r = radius of center of gravity of the rotating particle - m (ft)

g = acceleration of gravity - 9.81 m/s² (32.17 ft/s²)

ω = angular velocity - radian/s

R = measured inside radius of the trommel - m (ft)

rpm = revolutions per minute

β = inclination angle

$$\omega = \frac{2 \pi \text{ rpm}}{60}$$

Since a radian is an angle whose arc = radius, in one revolution a point of the circumference of the trommel will travel the circumference, or 2π radius.

$$R = r \text{ (assumed)}$$

For a trommel, the radius R is large compared to the particle. Therefore, it may be assumed that the radius of the center of gravity of the particle is equal to the measured inside trommel radius.

As shown in the diagram, the particle will cling to the surface of the trommel when the centrifugal force exceeds the force component of gravity in the radial direction, $F_c \geq W_r$. Critical speed is defined as the minimum rotational speed that produces a centrifugal force sufficiently large that the particles do not detach from the screen at top dead center and consequently the material rotates as a flywheel. This point will occur when:

$$\frac{\omega^2 r}{g \cos \beta} = 1$$

The critical speed is calculated as follows.

$$\omega_{\text{crit}} = \frac{g \cos \beta}{r}^{0.5}$$

Expressed in units of rpm and substituting R for r ,

$$\text{rpm}_{\text{crit}} = \frac{60}{2\pi} \frac{g \cos \beta}{r}^{0.5}$$

The Baltimore trommel is 3.7 m (12 ft) in diameter and has a critical speed of 22 rpm.

Speeds of 6, 9, and 12 rpm were selected because this covered the practical ranges of the existing variable speed trommel drive. A speed of 12 rpm is 55% of critical speed. Cal Recovery Systems (CRS) operated a pilot plant trommel of 0.9 m (3 ft) diameter at 36.6 rpm which is 82.8% of critical speed. At Baltimore, 18 rpm would be 82% of critical speed. Efforts to operate the trommel at speeds above 12 rpm by changing gear reducer sheave size were generally unsuccessful because of excessive vibration in the equipment. The plant would not operate at the higher speeds because of the likely increase in maintenance costs. Because the Baltimore trommel contains lifters, the importance of the critical speed consideration was minimized.

4.0 FIELD TESTING PROCEDURE

4.1 TROMMEL TEST CONDITIONS

The basic test objectives were to investigate the effects of material retention time and feedrate on trommel performance. During testing and data analysis other important operating and performance relationships were recognized and incorporated into the study. The trommel residence time is determined in part by the trommel rpm. To accomplish the test objectives, the trommel was tested as a function of rpm's and infeed flow rates. The nominal test schedule consisted of three rpm's and five flow rates; because the system could not be operated to provide a given flow rate, however, additional tests were performed in each test series, from which 15 tests were selected for analysis.

Each of the 15 tests was conducted four times, fall, winter, spring, and summer, to check for seasonal effects. The total test schedule is shown in Table 4.1 for a total of 60 tests.

TABLE 4.1. SEASONAL TEST SCHEDULE

Test	Month and year	No. of test runs
Fall (F)	October 1980	15
Winter (W)	January 1981	15
Spring (S)	May 1981	15
Summer (SM)	August 1981	15
Total		60

4.2 FIELD DATA COLLECTED

A summary of data collected during the field tests is provided in Table 4.2. The detailed testing procedure is provided in Appendix A.

TABLE 4.2. SUMMARY OF TYPES OF FIELD DATA COLLECTED

Field data collected	Measurement method
Ambient conditions	
• Temperature	Daily newspaper
• Precipitation	Daily newspaper
• Atmosphere	Visual observation
Trommel rpm	Tachometer and visual counting
Flow rate	Weight of material (overs and unders) for sampling time
Trommel energy requirements	Watts via amprobes and volt meter
Residence time	Leading edge and indicator material via stop watch and visual observation
Material samples	2-kg (4.4-lb) sample taken from material removed from belt for flow rate measurement
Bulk density	Weight of 0.2082-m ³ (55-gal.) container filled with material taken from belt for flow rate measurements

Data tabulated for each of the 60 runs included: (a) trommel rpm; (b) residence time by leading edge of overs (T_{R1}); (c) residence of tracer cards (T_{R2}); (d) sampling time; (e) total weight of overs and unders; (f) bulk density of overs and unders; (g) flow rate; and (h) power requirements.

4.2.1 Trommel RPM

Trommel rpm was measured and set by the tachometer, and test speeds were nominally 6, 9, and 12 rpm.

4.2.2 Residence Time in Seconds by Leading Edge of Overs (T_{R1})

The leading-edge residence time was determined by raking back material from the air classifier discharge on the conveyor belt until full flow occurred and a wall of material was formed. The time was then taken from trommel entrance to trommel exit of the wall of material.

4.2.3 Residence Time of Tracer Cards (T_{R2})

The residence time of the tracers was the time from trommel entrance to trommel exit of 3 x 5 in. (7.6 x 12.7 cm) colored card stock.

4.2.4 Sampling Time in Seconds

Sampling time was controlled by the individual observing the unders belt. This person started the sampling time on a signal from a person stationed on the overs belt and then terminated the test with a signal to stop all belts when the unders belt was full of material.

4.2.5 Weight of Overs and Unders Samples

All material going to the individual unders and overs belts during the timed tests was collected and weighed separately.

4.2.6 Bulk Density of Overs and Unders

A tared 55-gal. drum was loosely filled and weighed with each of the unders and overs materials. Bulk density was calculated on a basis of weight per unit volume.

4.2.7 Flow Rate in Weight per Hour

The total weight of unders and overs for a timed run was divided by the time of the run to provide an average flow rate for the duration of the test.

4.2.8 Power Requirements

The power requirements of the 10-hp trommel motor were determined by the use of amprobes on each of the three power leads and the monitoring of line voltage. The product of the average of the three amprobe readings times the monitored voltage times $\sqrt{3}$ times an assumed power factor of 0.85 provided a power requirement of the trommel for each test.

4.3 SAMPLES COLLECTED FOR LABORATORY ANALYSIS

Duplicate samples of approximately 2 kg (~ 4-1/2 lb) were taken from the overs and unders from each test run. Material was randomly handpicked from the overs fraction and the unders fraction was sampled by the cone and quarter techniques (see Section 6.1). Individual samples were double bagged and labeled inside and out. One series of samples was packaged into 55-gal. fiber drums and shipped to CRS laboratories in Richmond, California, for analysis. The duplicate series of samples was stored at the test site pending receipt of the set of samples at CRS. All the samples arrived in good condition at CRS. CRS analyzed samples from 15 of the tests from each test series after preliminary calculations to choose the most informative set of tests.

4.4 FIELD TEST SCHEDULE

The four series of field tests were conducted as functions of trommel rotational speed and infeed flow rate. The infeed rate to the trommel was established by setting the diverter to direct a uniform amount of flow from belt 14 to belt 15 (see Figure 3.5). It was not possible to provide a pre-determined flow rate. The flow rate was increased or decreased based on the subjective judgment of the diverter operator, and extra test runs were performed in order to span the range of flow rates of interest. Maximum infeed rate for the trommel is approximately 40 Mg/h, and tests were conducted close to this maximum.

On arrival of the field test crew at the facility, the trommel was examined for the degree of blinding (holes in the trommel plugged with material). When necessary, the trommel was thoroughly cleaned prior to initiation of tests. Visual observation throughout the test series indicated that the trommel remained on the order of 2% blinded.

4.4.1 Field Test Series No. 1

The autumn series of field tests was performed at the Baltimore County facility during the week of October 20, 1980. Weather throughout the test period was mild and clear with temperatures ranging from 4.5° to 22.8°C (40° to 73°F). Twenty tests were conducted at trommel rotational speeds of 6, 9, and 12 rpm (27, 41, and 55% of critical speed) and at trommel infeed rates ranging from 0.36 to 38.5 Mg/h. Fifteen of the 20 tests were subsequently selected for analysis. Table 4.3 shows the overall test matrix and the tests selected for study.

TABLE 4.3. MATRIX OF TEST SERIES NO. 1

Rotational and circumferential speed		
6 rpm (1.15 m/s)	9 rpm (1.72 m/s)	12 rpm (2.30 m/s)
0.36 Mg/h	2.82 Mg/h*	1.70 Mg/h
1.76 Mg/h*	5.85 Mg/h*	3.43 Mg/h*
3.13 Mg/h*	6.30 Mg/h	9.11 Mg/h*
4.74 Mg/h*	10.55 Mg/h*	13.62 Mg/h*
12.84 Mg/h*	15.86 Mg/h*	15.10 Mg/h
21.30 Mg/h	22.55 Mg/h*	30.27 Mg/h*
23.91 Mg/h*		38.52 Mg/h*

* Samples from these tests were selected for analysis.

4.4.2 Field Test Series No. 2

The winter series of field tests was performed during the week of January 26, 1981. Eighteen tests were conducted at trommel speeds of 6, 9, 12, and 15 rpm (27, 41, 55, and 67.5% of critical speed) and at trommel infeed rates ranging from 0.96 to 33.49 Mg/h. Weather conditions during the tests were clear with temperatures ranging from 3.3° to 13.9°C (38° to 57°F). Table 4.4 shows the test matrix. The three tests at 15 rpm were not selected for analysis because excessive vibration at this speed indicated that it would be unpractical to operate the trommel at 15 rpm on a continuous plant production basis. Thus, results from 15-rpm tests would be meaningless as they would not be indicative of results within the trommel operating range. The remaining samples at the slower rpm's were all selected for analysis.

TABLE 4.4. MATRIX OF TEST SERIES NO. 2

Rotational and circumferential speed			
6 rpm (1.15 m/s)	9 rpm (1.72 m/s)	12 rpm (2.30 m/s)	15 rpm (2.88 m/s)
0.96 Mg/h	1.97 Mg/h	3.62 Mg/h	5.59 Mg/h
2.97 Mg/h	2.55 Mg/h	6.09 Mg/h	15.06 Mg/h
5.58 Mg/h	7.23 Mg/h	6.69 Mg/h	33.49 Mg/h
9.62 Mg/h	10.49 Mg/h	7.42 Mg/h	
12.57 Mg/h	17.01 Mg/h	17.64 Mg/h	

4.4.3 Field Test Series No. 3

The spring series of field tests was conducted during the week of May 4, 1981. Seventeen tests were conducted at trommel speeds of 6, 9, and 12 rpm and at trommel infeed rates ranging from 2.8 to 46.7 mg/h. Samples from 15 of these tests were selected for analysis. Weather conditions during the tests were clear with temperatures ranging from 12.8° to 26.7°C (55° to 80°F). A pronounced compositional difference from the fall and winter samples was evident due to the large quantity of grass clippings in the municipal waste. Table 4.5 shows the test matrix.

TABLE 4.5. MATRIX OF TEST SERIES NO. 3
(Mg/h versus rpm)

Rotational and circumferential speed		
6 rpm (1.15 m/s)	9 rpm (1.72 m/s)	12 rpm (2.30 m/s)
2.82 Mg/h*	6.32 Mg/h*	2.60 Mg/h
5.05 Mg/h*	6.48 Mg/h*	2.92 Mg/h*
5.21 Mg/h*	8.56 Mg/h*	9.90 Mg/h*
29.10 Mg/h	31.67 Mg/h*	10.59 Mg/h*
26.44 Mg/h*	32.90 Mg/h*	17.69 Mg/h*
29.56 Mg/h*		46.55 Mg/h*

* Samples from these tests were selected for analysis.

4.4.4 Field Test Series No. 4

The summer series of field tests took place during the week of August 17, 1981. Fifteen tests were conducted at trommel speeds of 6, 9, and 12 rpm and at trommel infeed rates ranging from 1.47 to 33.28 Mg/h (Table 4.6).

TABLE 4.6. MATRIX OF TEST SERIES NO. 4

Rotational and circumferential speed		
6 rpm (1.15 m/s)	9 rpm (1.72 m/s)	12 rpm (2.30 m/s)
2.64 Mg/h	1.47 Mg/h	2.11 Mg/h
3.56 Mg/h	6.91 Mg/h	2.41 Mg/h
7.80 Mg/h	10.17 Mg/h	4.91 Mg/h
10.63 Mg/h	12.71 Mg/h	13.79 Mg/h
23.26 Mg/h	33.28 Mg/h	32.06 Mg/h

Weather conditions during the tests were clear with temperatures ranging from 12.8 to 26.7°C (55 to 80°F). The pronounced compositional difference from the fall and winter samples was again evident, as it had been in the spring series of tests, due to the large quantity of grass clippings in the municipal waste.

4.5 FIELD TESTING PROBLEMS

The general conduct of the test runs was quite smooth, and the help and cooperation of the plant personnel were excellent. The most pronounced problem was the inability to establish given infeed flow rates, which resulted in numerous runs being scrubbed and time loss due to the necessity to clear the system prior to starting the next run. Additionally, several runs in excess of the nominal 15 runs per test series were conducted to insure an acceptable range of infeed rates (the infeed rate was calculated subsequent to the test run). Few runs needed to be scrubbed due to human error, such as losing track of sampling time, missed signals, and confusion resulting from plant crew changes. Mechanical problems resulting in lost time and scrubbed test runs included stop watch malfunction, malfunction of a conveyor control switch, and trommel rotation stopping due to an unbalanced load.

Efforts to conduct tests at trommel rotational speeds greater than 12 rpm resulted in excessive trommel vibration and stress cracking of the steel trommel drive ring which is in contact with a steel drive wheel. Therefore, 12 rpm, which is 55% of critical speed, is the maximum speed for this trommel design.

All test runs selected for evaluation and product testing were problem free and, to the best of our knowledge, anomaly free. Thus, the test runs represent conditions which could be achieved under continuous commercial production operations. All parameters for these runs were as precise and accurate as possible within the constraints of the test plan.

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5.0 LABORATORY ANALYSIS PROCEDURES

5.1 SUBSAMPLING OF GROSS SAMPLES

Gross samples were subsampled for analyses using the mixing and quartering technique. In this technique, the material is mixed and formed into a loose conical pile and divided vertically into quarters. Two opposite quarters are discarded and the remaining two are mixed and again formed into a conical pile. The procedure is repeated until the desired sample size is obtained.

5.2 AIR-DRY MOISTURE ANALYSIS

The air-dry moisture content of the test samples was determined by drying the samples at 22°C (72°F) and 65% relative humidity until they showed no further loss in weight. Air-dry moisture content is reported as: $(\text{as-received weight} - \text{air-dry weight}) / (\text{as-received weight})$.

5.3 SIZE DISTRIBUTION ANALYSIS

The size distributions of the test samples were determined after air-drying of the samples with the use of manual and mechanical screening apparatus. Manual screening was employed for material that exceeded 5 cm. Mechanical screening was used for material less than 5 cm. Size distribution data are presented on an air-dry weight basis.

5.4 COMPOSITION ANALYSIS

The composition of the test samples was determined by manually sorting the components. The components are paper and plastic, ferrous, nonferrous, glass, organic other, inorganic other, and material passing a 14 mesh (1.30 mm) sieve, termed fines. In the category organic other is included organic material other than paper and plastic, for example, cloth, garden waste, and wood. The category inorganic other includes inorganic material other than glass, metals, and less than 1.30-mm fines. Sorting of the components was done by size class. The exact composition of the fines is unknown as the individual particles are too small for visual analysis. It is assumed the less than 1.30-mm fines are primarily noncombustible items such as glass, sand, and dirt.

Composition data are presented on an air-dry weight basis.

5.5 OVEN-DRY MOISTURE ANALYSIS

The oven-dry moisture content was determined by drying subsamples of material at 100°C (212°F) until constant weight was achieved. The subsamples were prepared by milling the material to less than 6 mm and selecting a representative 15- to 20-g sample using the coning and quartering technique.

5.6 ASH CONTENT ANALYSIS

The material was prepared by milling it to less than 6 mm in size, selecting a 15- to 20-g representative sample using the cone and quartering technique, and subjecting it to oven-drying.

The ash content of the samples was determined in accordance with ASTM Standard D 3174, adapted for use with shredded refuse. The oven-dry subsamples were ignited in a muffle furnace held at a temperature of 700° to 725°C (1292° to 1337°F). Samples remained in the furnace until no weight loss was registered. Ash content results are reported on an oven-dry weight basis and calculated as $(\text{final weight})/(\text{oven-dry weight}) \times 100\%$.

5.7 HEATING VALUE ANALYSIS

The heating value analyses were performed by adiabatic bomb calorimetry in accordance with ASTM Standard D 2015, adapted for refuse. Representative subsamples of material were prepared by milling the material to less than 1 mm size and selecting from the milled material a representative subsample of 15 to 20 g. Following oven-drying of the 15- to 20-g sample, a representative 1-g subsample was selected for calorific determination. The calorific determinations are reported in terms of the higher heating value and are presented on an oven-dry weight basis.

6.0 TEST RESULTS

6.1 OPERATION AND PERFORMANCE

The results of the field tests have been compiled into the following tables for clarity of presentation. Appendix B contains the component/size distributions of the feed, oversize, and undersize for each of the 60 test runs. Fifteen test runs are associated with each of the quarterly testing periods. Appendix C contains screening performance data and properties of the feed, oversize, and undersize fractions. Data for the feed, oversize, and undersize fractions are used in the development of the performance characterization parameters. The first table in Appendix C describes the organization of the appendix with respect to the contents of the tables and with respect to the corresponding quarterly testing period. Four tables of test results are presented for each of the testing periods.

All key performance parameters, except for Ash/Energy of the Oversize Fraction, have been normalized in terms of the input properties (i.e., those calculated for the feed material) in order to eliminate as much as possible the variations in trommel performance that would be attributable to changes in the properties of the feed material. A considerable variation in the properties of the feed material was found during the study (as discussed in Section 6.2). The rationale, validity, and significance of the method of normalization in terms of feedstock properties has been published previously^{1,2} and was used for air classifier performance characterization.

The key screening performance parameters are:

- Screening Efficiency (percent)
- Ash Content Removal (percent)
- Moisture Content Removal (percent)
- Organic Content Improvement (percent)
- Organic Recovery (percent)
- Heating Value Improvement (percent)
- Energy Recovery (percent)
- Ash per Energy Content of Oversize Fraction (kg/GJ)

The definitions of the key parameters are presented in the glossary while their description and significance are discussed in Section 7, "Performance Characterization."

Wide variations may be observed in the material properties and in the performance parameters presented in Appendix C. Variations in the feed are

due to seasonal variations, as well as the basic heterogeneity of MSW. The properties of the oversize and undersize fractions are dependent upon the properties of the feed and upon trommel operating conditions. Similarly, screening performance parameters are a function of the properties of the feed material and of trommel operating conditions. A detailed interpretation of trommel operation and performance is presented in Section 7.

Also included in the test result tables of Appendix C are the measurements taken of residence time. Although the residence time of the material within a trommel screen is a key parameter in terms of analyzing the particle dynamics, the study team achieved only limited success in obtaining consistent data. Neither timed measurements of the leading edge nor of card tracers inserted with the feed material provided satisfactory results. Despite the fact that the methods had been developed and tried previously,³ the residence time measurements at the Baltimore County site produced variations that in some cases defy physical interpretation. As one example, the tracer residence time data for the May 1981 tests conducted at 6 rpm show no discernible trend despite a ten-fold increase in feedrate. The latter example is by no means the only one to illustrate the point. The variations in the residence time data (i.e., that data lacking an interpretation) apparently are a consequence of the method of measurement, the bias of the visual observer, and the complexity of particle motion inside of the trommel. Based upon the finding in this study, a method of residence time measurement needs to be developed, tested, and interpreted. The reason is that residence time is a key parameter for equipment design and for developing and verifying the governing relations for trommeling. The present study identifies the need and at the same time provides data that may serve as a general range of residence times that are encountered under specific operating conditions and using specific methods of residence time measurement.

6.2 SEASONAL VARIATIONS

Inasmuch as seasonal variations occur in the composition of municipal solid waste, one of the objectives of the study was to determine the effect of such variations in composition on trommel performance. The results of the four field tests in terms of trommel feed characteristics are shown in Table 6.1.

The average characteristic and nominal particle sizes of the trommel feed were found to vary substantially at different times of the year. Figure 6.1 depicts the average characteristic and nominal particle sizes (63.2 and 90 cumulative percent passing, respectively) of 15 test runs for each test period. The error bars indicate the 95% confidence limits. The smallest particle sizes occurred in summer and the largest in winter. The characteristic particle size was over twice as large in winter as it was in summer and the nominal size was approximately 50% higher in winter than in summer. The second smallest particle sizes occurred in spring and the third smallest occurred in the fall. The large number of grass clippings present in the feed in summer is one major reason that the characteristic and nominal particle sizes are smallest at that time.

TABLE 6.1. SEASONAL VARIATIONS IN TROMMEL FEED CHARACTERISTICS
(Average Values for 15 Runs in Each Test Period)

Test period	Statistical parameter	Characteristic size (mm)	Nominal size (mm)	As-Received moisture content (%)	As-Received ash content (%)	As-Received heating value (kJ/kg)	Ash/Energy content (kg ash/GJ)	Air-Dry organic content (%)
October 1980	Mean	21.40	65.37	25.32	18.63	13,254	14.16	76.19
	Stand. Dev.	5.80	10.58	3.59	4.68	915	3.81	6.86
	Maximum	33.00	76.20	33.11	31.60	14,886	23.48	84.99
	Minimum	13.90	43.20	20.53	11.62	11,490	8.20	56.77
	UCL (95)*	24.61	71.23	27.31	21.22	13,761	16.27	79.99
	LCL (95)**	18.19	59.51	23.33	16.04	12,747	12.05	72.39
January 1981	Mean	36.34	76.90	21.68	18.76	--	--	80.78
	Stand. Dev.	14.42	9.44	5.08	4.74	--	--	5.17
	Maximum	65.00	92.70	29.71	27.49	--	--	93.58
	Minimum	16.10	60.60	7.21	11.68	--	--	74.44
	UCL (95)	44.33	82.13	24.49	21.39	--	--	83.64
	LCL (95)	28.35	71.67	18.87	16.13	--	--	77.92
47 May 1981	Mean	15.83	57.33	29.77	16.51	11,132	15.45	76.38
	Stand. Dev.	5.43	19.72	4.95	3.80	1,773	4.98	8.87
	Maximum	26.20	77.50	38.59	21.95	13,853	23.02	90.93
	Minimum	6.40	25.10	16.75	9.29	8,067	7.22	54.28
	UCL (95)	18.84	68.25	32.51	18.61	12,114	18.21	81.29
	LCL (95)	12.82	46.41	27.03	14.41	10,150	12.69	71.47
August 1981	Mean	13.21	51.82	34.92	17.92	--	--	74.13
	Stand. Dev.	2.54	5.84	3.79	3.65	--	--	4.08
	Maximum	17.53	64.26	40.71	23.63	--	--	80.48
	Minimum	9.40	46.23	29.80	11.73	--	--	65.47
	UCL (95)	14.73	54.86	37.02	19.94	--	--	76.39
	LCL (95)	11.68	48.51	32.82	15.90	--	--	71.87

* UCL (95) = Upper 95% confidence limit.

** LCL (95) = Lower 95% confidence limit.

Figure 6.1. Seasonal Variations of the Characteristic and Nominal Particle Size of the Feed to the Trommel.

The average ash content and average moisture content of the trommel feedstock during different seasons are shown in Figure 6.2. The values presented are the averages of 15 test runs for each test period. The ash content was essentially constant throughout the year; however, the moisture content varied significantly throughout the year. In order of occurrence of the largest moisture contents of the feed, the seasons of the year are: summer, spring, fall, and winter. The moisture content of the trommel feed was approximately 70% higher in summer than it was in winter. The large proportion of garden wastes in the MSW during the spring and summer is partially responsible for the high moisture content. Inasmuch as no precipitation occurred during any of the test periods, rainfall did not contribute to the seasonal discrepancies in moisture content of the feedstock.

The organic content and the heating value of the trommel feedstock are shown in Figure 6.3 as the average of the 15 test runs for each test period. The organic content is presented on an air-dry basis and the heating value is presented on an as-received basis. It is not possible to report the organic content on an as-received basis inasmuch as the component/size distributions were performed after air drying and the moisture content of the individual components were not determined. The data in the figure indicate that the variation in organic content is small and that the trend for the highest organic content occurs in an order that is precisely the opposite as cited for the trend for the highest moisture content. Consequently, on an as-received basis, the organic content would probably be relatively constant.

Also shown in Figure 6.3, is the seasonal variation in the heating value of the trommel feedstock. The 20% difference in the as-received heating values for the feedstock from May and October is a result of a higher moisture content and a lower heating value (oven-dry basis) for the feed material encountered in the May tests.

No conclusions have been drawn with respect to the variations in screening performance parameters over the different seasons of the year because of the impossibility of identifying one performance parameter that varies while the others remain invariant. For example, there are no two test runs in different test periods that have identical feed rates and rotational speeds.

Figure 6.2. Seasonal Variations of the Ash Content and the Moisture Content of the Feed to the Trommel.

Figure 6.3. Seasonal Variations of the Organic Content and the Heating Value of the Feed to the Trommel.

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7.0 PERFORMANCE CHARACTERIZATION

This section characterizes trommel performance for the four series of tests. Table 7.1 provides a guide to figures showing performance characterization plots. Component/size distribution data are provided in Appendix B, and summary tables of trommel performance data and properties of the feed, oversize, and undersize fractions are provided in Appendix C.

7.1 SCREENING EFFICIENCY

The parameter most commonly used for the characterization of screening performance is the screening efficiency. This parameter represents the percentage of undersize material entering the screen that passes through the apertures in the screen to the undersize conveyor belt. In equation form, screening efficiency (η) can be formulated in several ways. The following form was used for purposes of this study:

$$\eta \equiv \frac{\dot{m}_u}{\dot{m}_u + U_o \dot{m}_o} \quad (7.1)$$

where,

$\dot{m}_u$ = flow rate of the undersize fraction

$\dot{m}_o$ = flow rate of the oversize fraction

U_o = fraction of true undersize material in the oversize fraction

The effects of feedrate and rotational speed on screening efficiency are shown in Figure 7.1. Results for each of the four testing periods are presented in the figure. One test in May at 46.55 Mg/h feedrate and 12 rpm was not plotted in Figure 7.1 nor in any subsequent figures for the purpose of convenience in figure construction. The data for this test are contained in the relevant Appendices B and C tables.

Figure 7.1 indicates that for a given set of operating conditions, screening efficiency decreases as feedrate increases. This effect is the result of the increased bed depth with increased feedrate and a concomitant increase in the probability that an aperture is covered. Within the range of measured feedrates tested, nominally 1 to 40 Mg/h, the decrease in efficiency with increased feedrate appears to be linear. Typical operating

TABLE 7.1. GUIDE TO PERFORMANCE CHARACTERIZATION PLOTS

Figure No.	Number of plots in figure	Figure title
7.1	4	Effect of feedrate and rotational speed on screening efficiency.
7.2	4	Effect of feedrate and rotational speed on ash content and moisture content of overs.
7.3	4	Effect of feedrate and rotational speed on ash content removal and moisture content removal.
7.4	4	Effect of feedrate and rotational speed on organic quality improvement and organic recovery.
7.5	2	Effect of feedrate and rotational speed on heating value of oversize fraction.
7.6	2	Effect of feedrate and rotational speed on heating value improvement and energy recovery.
7.7	2	Effect of feedrate and rotational speed on ash production per unit energy.
7.8	2	Comparison of heating value and organic content.
7.9	1	Trommel energy requirements versus trommel infeed rate.
7.10	1	Organic content of oversize and organic recovery as a function of screen aperture size.

a) October 1980

b) January 1981

c) May 1981

d) August 1981

Figure 7.1. Effect of Feedrate and Rotational Speed on Screening Efficiency.

feedrates at the plant are in the range of 7 to 13 Mg/h. Thus, the linear relationship between efficiency and feedrate holds for the range of feedrates encountered at the plant. Moreover, the linear relationship extends to efficiencies below 40%, which are beyond the practical operating limits (in terms of feedrate capacity) of the screen. For feedrates greater than those tested, it is conjectured that the linear relationship between efficiency and feedrate would break down.

In the range of typical trommel operating conditions at the plant (i.e., 7 to 13 Mg/h and 9 rpm), screening efficiencies in the range of 50 and 90% were measured. For feedrates near 14 Mg/h, the measured efficiencies (50 to 70%) are relatively low when compared to those typical of screening operations in general. To achieve screening efficiencies greater than 80%, the maximum allowable feedrate should be approximately 7 to 9 Mg/h.

The effect of rotational speed on screening efficiency also is illustrated in Figure 7.1; however, the trends are somewhat masked as a result of scatter in the data. Nevertheless, the data indicate that screening efficiencies generally increase with increases in rotational speed. As the reader will note from the data shown in Figure 7.1, the differences in the levels of efficiency for each rotational speed are more discernible at the higher feedrates. The reason that screening efficiency increases with increased rotational speed is that bed depth decreases with increased rotational speed. The effect of bed depth becomes more important as the feedrate is increased. Conversely, the effect of lifters (which are present in the Baltimore County trommel) is to mitigate the effect of rotational speed on screening efficiency, the reason being that irrespective of rotational speed, lifters tend to raise material to approximately the same point of detachment from the screen surface.

It should be noted that the "screening efficiency" parameter indicates the performance of a screen on the basis of the separation of particles according to particle size. This basis may or may not have a relation to the principal objective of the screening operation. Screening efficiency is not a direct measure of the performance of a screen in regard to the separation of material components in the feed or to the changing (improvement) of material properties of the separated streams (e.g., heating value of the oversize fraction). At the present time, the principal objective of trommel screening in resource recovery processing is rarely to separate materials according to size, but rather to separate material components or to increase the heating value and decrease the ash content of a separated fuel fraction. In light of the above remarks, additional parameters that quantify screening performance in terms of criteria other than size separation are presented in subsequent sections.

7.2 ASH CONTENT AND MOISTURE CONTENT REMOVAL

One of the major concerns in the preparation of refuse derived fuel (RDF) is the reduction of ash content in the fuel. Reducing the ash content is beneficial for a number of reasons, among them are: (a) a reduction in boiler slagging problems; (b) a reduction in ash handling and disposal

problems at the power plant; and (c) an increase in the heating value of the fuel. Similarly, a reduction of the moisture content of the fuel will increase its heating value. Screening of a shredded and air classified feedstock results in an oversize fraction with an ash and moisture content that is lower than that of the feed because, in general, the undersize material has a higher ash content and a higher moisture content than that of the feedstock.

The ash content and moisture content of the Baltimore County oversize fractions are shown in Figure 7.2 for the various test runs. The values are presented on an as-received basis. Both the ash content and the moisture content of the oversize material tend to increase as the feedrate increases. This effect is the result of increased retention of undersize material in the screen as the feedrate increases.

It should be noted that the ash content and the moisture content of the oversize material are functions of the ash content and the moisture content in the feed. Consequently, during the course of the study two parameters were developed to characterize the ash content and moisture content of the oversize fraction as a function of those of the trommel feedstock.

The two parameters, ash content removal (ACR) and moisture content removal (MCR) are defined below.

$$ACR \equiv \frac{AC_f - AC_o}{AC_f} \times 100 \quad (7.2)$$

where,

AC_f = ash content of the feed

AC_o = ash content of the oversize fraction

$$MCR \equiv \frac{MC_f - MC_o}{MC_f} \times 100 \quad (7.3)$$

where,

MC_f = moisture content of the feed

MC_o = moisture content of the overs

The weight bases for both definitions is as-received.

a) October 1980

b) January 1981

c) May 1981

d) August 1981

Figure 7.2. Effect of Feedrate and Rotational Speed on Ash Content and Moisture Content of Oversize.

The ash content removal and the moisture content removal are shown in Figure 7.3 for the various test runs. From the data, the decreasing trend for MCR and ACR can be discerned for increases in the feedrate. At the normal operating feedrates (7 to 13 Mg/h) for the Baltimore County trommel, approximately 45 to 70% of the ash in the feed is removed and approximately 5 to 10% of the moisture in the feed is removed.

7.3 ORGANIC CONTENT IMPROVEMENT AND ORGANIC RECOVERY

One manner of characterizing the performance of a RDF system is to examine the effectiveness of the separation of the organic fraction of MSW from its inorganic constituents. Accordingly, the Baltimore County trommel serves to further refine and concentrate the organic fraction of air-classified light fraction produced at the plant. The purpose of increasing the organic content follows from the principal goals of increasing the heating value and decreasing the ash content of the fuel.

Based upon the component classifications used in this study, the organic quality of a particular waste fraction (Q) is defined by the relation,

$$Q \equiv \frac{W_{pp} + W_{oo}}{W_t} \times 100 \quad (7.4)$$

where,

Q = organic content and is expressed as a percentage

W_{pp} = weight of "paper and plastic"

W_{oo} = weight of "organic other" material

W_t = total material

All weights being on an air-dry weight basis.

In order to evaluate the performance of the screen in terms of the organic content of the oversize fraction, two performance parameters are defined. Organic quality improvement indicates the percentage increase in the organic content of material in the oversize fraction when compared to that of the feed. Organic quality improvement, I_q , is defined by

$$I_q \equiv \frac{Q_+}{Q_f} \times 100 \quad (7.5)$$

where,

Q_f = organic content of the feed expressed as a percentage

Q_+ = organic content of the oversize fractions expressed as a percentage

a) October 1980

b) January 1981

c) May 1981

d) August 1981

Figure 7.3. Effect of Feedrate and Rotational Speed on Ash Content Removal and Moisture Content Removal.

Organic recovery, R_o , indicates the percentage of organic material in the feed that is recovered in the oversize fraction. R_o is defined by

$$R_o \equiv mf_+ \frac{Q_+}{Q_f} \times 100 \quad (7.6)$$

where,

mf_+ = mass fraction of oversize material expressed on an as-received weight basis

Organic quality improvement and organic recovery for the various test runs are shown in Figure 7.4. The organic improvement factor decreases with increasing feedrate, while the recovery of organics increases and eventually plateaus as the feedrate is increased. The trends in the data indicate the tradeoffs that exist between improving the organic content of the fuel fraction and maximizing the recovery of organics. As may be noted from Figure 7.4, for the range of normal operating feedrates for the Baltimore County trommel (7 to 13 Mg/h), the organic quality improvement is approximately 120 to 130% and the recovery of organics is approximately 75 to 80%.

7.4 HEATING VALUE IMPROVEMENT AND ENERGY RECOVERY

Heating value was also used as a means of characterizing the properties of the over- and undersize fractions and in the development of two performance parameters, namely, the heating value improvement factor and the energy yield. From heating value analyses performed on samples of oversize and undersize material obtained during the October 1980 and May 1981 tests, the effect of operational variables may be judged. For example, the heating values of the oversize fractions for the tests (shown in Figure 7.5) data indicate that as feedrate increases, the heating value of the oversize fraction decreases. In the range of normal operating feedrates for the trommel (7 to 13 Mg/h), the heating value of the oversize fraction is approximately 15,000 to 17,000 kJ/kg (approximately 6,500 to 7,300 Btu/lb), expressed on an as-received moisture basis.

Invoking the concepts of heating value improvement, I_{hv} , and energy recovery, R_e , and defining them similarly to organic improvement and organic recovery but in terms of heating value, results in the following definitions.

Figure 7.4. Effect of Feedrate and Rotational Speed on Organic Quality Improvement and Organic Recovery.

Figure 7.5. Effect of Feedrate and Rotational Speed on Heating Value of Oversize Fraction.

$$I_{hv} \equiv \frac{HV_+}{HV_f} \times 100 \quad (7.7)$$

where,

HV_f = heating value of the feed

HV_+ = heating value of the oversize fraction on an as-received weight basis)

and,

$$R_e \equiv mf_+ \frac{HV_+}{HV_f} \times 100 \quad (7.8)$$

where,

mf_+ = mass fraction of the oversize material expressed on an as-received weight basis

Heating value improvement identifies the improvement in the heating value of the oversize material in terms of a percentage of the feedstock heating value and equals 100% if the heating values of both fractions are identical.

Heating value improvement and the energy yield are shown in Figure 7.6 for the test runs in which heating values were measured. Similar to the results obtained for parameters utilizing organic content, heating value improvement decreases with increases in the feedrate and the energy recovery ratio increases with increases in the feedrate. A greater mass fraction of the feed is recovered in the oversize fraction at high feedrates due to the poor screening efficiency and the concomitant retention of undersize organic material. However, a greater proportion of undersize inorganic material is also retained, thus increasing the ash content of the fuel (see Figure 7.3).

The ash production per unit energy of fuel for the test runs is shown in Figure 7.7. This parameter is an indication of both the ash content and the heating value of the fuel. As shown by the data in the figure, the ash production per unit energy increases with increasing feedrate. According to the results of the October 1980 tests, the ash production per unit energy is approximately 3 to 6 kg ash/GJ (approximately 7 to 12 lb ash/MMBtu) in the range of normal operating feedrates for the trommel. Substantial scatter in the results of the May 1981 tests makes estimations of this parameter difficult for that test period.

Figure 7.6. Effect of Feedrate and Rotational Speed on Heating Value Improvement and Energy Recovery.

Figure 7.7. Effect of Feedrate and Rotational Speed on Ash Production Per Unit Energy.

Although the heating value provides a better description of fuel value than does organic content in terms of energy content, few processing plants have the capability of measuring heating value. Thus, the value of performance parameters based on organic content lies in the fact that screening performance can be evaluated by means of a component/size distribution analysis, rather than by employing bomb calorimetry and its rigorous test protocol. The utility of using organic content is exemplified by an inspection of Figures 7.4 and 7.6 in which are indicated similar trends for both the organic content and the heating value as a function of feedrate. As further evidence of their compatibility and interchangeability, Figure 7.8 has been constructed to illustrate the relationship between heating value and organic content of feed and oversize fractions. The data in the figure show that as a first order approximation the heating value is linearly proportional to the organic content.

7.5 TROMMEL ENERGY REQUIREMENTS

As shown in Figure 7.9, the energy requirements of the trommel motor per weight of infeed decreases rapidly as the infeed rate is increased. These data are from the first test series (October 1980) and are representative of all test series.

The data in Appendix C indicate that power requirements were in the range of 2.3 to 6.6 kW over the range of measured feedrates (1 to 46 Mg/h) while the specific energy requirements were in the range of 0.1 to 3.8 kWh/Mg. It may be gleaned from the power and throughput entries that power draw for the Baltimore trommel is not a strong function of throughput.

7.6 COMPONENT AND SIZE DISTRIBUTION

The previous discussions have shown that the trommel improves organic content and reduces ash content, which results from the fact that most of the noncombustibles are smaller than the 32-mm (1-1/4-in.) round trommel screen opening. The tables presented in Appendix B list the component and size distributions of the feed, oversize, and undersize flow streams for each test run. The data in these tables are the basis for the calculations of the screening performance parameters such as screening efficiency, organic quality improvement, organic recovery, etc.

Because the infeed to the trommel has been passed over a magnetic separator and then air classified before it reaches the trommel, the infeed does not contain appreciable quantities of metal. Glass, inorganic other, and fines are the major categories of noncombustible items. Fines are materials smaller than 1.3 mm and, thus, too small for accurate visual identification of components. The fines are mostly a grit material which is assumed to be mainly noncombustible.

Inspection of Appendix B tables indicates that material in the glass and inorganic other categories is almost always smaller than 16 mm (5/8 in.). Occasionally, small percentages are found in larger size classes, but the large majority is always smaller than 16 mm (5/8 in.), whether the sample is of the feed, overs, or unders flow streams.

a) October 1980

b) May 1981

Figure 7.8. Comparison of Heating Value and Organic Content.

Figure 7.9. Trommel Energy Requirements Versus Infeed Rate.

Unfortunately, the combustible materials of paper and plastic and organic other are distributed throughout the particle size range and also occur within the size fractions of glass and inorganic other. Consequently, removal, by screening, of the noncombustibles that are mainly less than 16 mm also result in removal of combustible materials. The tradeoff between removal of noncombustibles and recovery of combustibles is, of course, the primary consideration in the design selection of the screen aperture size. Optimum screen aperture size can be estimated for specified trommel performance if 100% screening efficiency is assumed. However, theoretical predictions of screening performance parameters quickly become very complex when screening inefficiencies are considered. Ultimately, the market demand for the fuel produced may be the overriding factor in aperture size selection. For example, when the market demand for RD is only a small fraction of the RDF production capacity, then a very large aperture size may be selected to insure a very high quality fuel. The low recovery in such a case is of no concern.

7.7 BULK DENSITY

Bulk density measurements were made of the oversize and undersize samples. Bulk density of the oversize ranged from 25.6 to 110.7 kg/m³ (1.6 to 6.9 lb/ft³) and that of the undersize ranged from 65.0 to 244.8 kg/m³ (4.1 to 15.3 lb/ft³). For any given test, the undersize bulk density was always greater than the oversize because the higher ash content undersize that was removed contained higher density materials. The particular bulk density of the oversize depends on the bulk density of the infeed and how much screening is achieved. Within the 7 to 13 Mg/h normal infeed range, the oversize bulk density ranges from 30.7 to 110.7 kg/m³ (1.9 to 6.9 lb/ft³) and the undersize from 105.1 to 232.0 kg/m³ (6.6 to 14.5 lb/ft³). The significance of these data is that regardless of trommel performance there is a wide variation in bulk density that the design of materials handling equipment must take into account when designing equipment such as conveyors.

8.0 ECONOMIC ANALYSIS

8.1 CAPITAL COSTS

8.1.1 Conversion to Current Dollars

Plans for constructing the Baltimore County Plant were made in 1973, and construction took place during 1974 and 1975. Shredding and ferrous metal recovery operations commenced in January 1976. The base year for calculating current dollar capital costs is 1974. While some construction operations continued in 1975, 1974 was the year that agreements were established for the construction and for the purchase and installation of the majority of the equipment.

Chemical Engineering's Plant Cost Index has been used to convert from 1974 to 1981 dollars.⁴ The year 1981 is used as the most recent full year.

The Chemical Engineering index is a widely accepted published index of the increasing costs of building industrial plants. The Plant Cost Index includes equipment, fabricated machinery, supports, construction and engineering labor, building and materials, and supervision. Thus, it is the general index that best fits the Baltimore plant. Other indexes, such as the Marshall and Swift Equipment Cost Index, are available but are not more definitive for resource recovery plants.

The Chemical Engineering Magazine index is the following.

<u>Year</u>	<u>Plant Cost Index</u> <u>(years 1957-1959=100)</u>	<u>Multiplier</u> <u>to year 1981</u>
1974	165.4	1.80
1975	182.4	1.63
1976	192.1	1.55
1977	204.1	1.46
1978	218.8	1.36
1979	238.7	1.24
1980	261.1	1.14
1981	297.0	1.0

The calculation of the multiplier for converting from one year to another is shown in the following example for 1974 to 1981.

$$\begin{aligned}\text{Multiplier} &= 1 + \frac{1981 \text{ index} - \text{year installed index}}{\text{year installed index}} \\ &= 1 + \frac{297.0 - 165.4}{165.4} = 1.80\end{aligned}$$

8.1.2 Total Plant Cost

The original 1974 plant cost was \$8.4 million followed by \$1,048,719 of equipment installed from 1975 through 1978, bringing the total plant cost to \$9.4 million. The equivalent 1981 dollar cost (Table 8.1) is \$16.7 million. All equipment costs reported are installed costs.

The trommel screen installation was \$35,000 in 1976, which is equivalent to \$54,300 in 1981. While the physical size of the trommel (3.7 m diameter by 8.0 m length) is significant, its installation at Baltimore was no problem, as the RDF facility building had sufficient head room and floor space to accommodate the trommel.

Capital cost of the trommel is a minor part of the total plant. In terms of 1981 dollars, the \$53,300 trommel cost is only 0.3% of the total plant and 3.6% of the \$1.5 million RDF facility. Thus, the trommel is not a major expense compared to the rest of the plant equipment.

8.2 OPERATING AND MAINTENANCE COSTS

8.2.1 Operating Costs

8.2.1.1 Labor and Overhead--

Operating costs for the trommel include operation and supervision labor, indirect costs, and electric power. There are no trommel operators as such, and inclusion of the trommel does not increase the labor hours for operation or supervision. However, the trommel is a part of the plant and a portion of the operation and supervision labor as well as other indirect costs should be assigned to the trommel operation. This is best done on a percentage of capital cost basis. Table 8.1 shows that in 1981 dollars the trommel cost of \$54,300 is 3.55% of the total RDF facility cost. Labor costs for the total RDF plant and the percentage assignment to the trommel are as follows.

TABLE 8.1 INSTALLED CAPITAL COSTS OF BALTIMORE COUNTY
RESOURCE RECOVERY FACILITY

MSW shredder facility		Year installed	Cost (\$)	Multiplier to 1981	Calculated 1981 \$
Site improvements, building, ferrous recovery, truck scales, conveyors, and engineering		1974	5,200,000	1.80	9,360,000
Primary shredder system		1974	2,600,000	1.80	4,680,000
Market and product development		1974	600,000	1.80	1,080,000
Cardox fire protection system for shredders		1977	15,785	1.46	23,000
Total: Shredder Facility			8,145,785		15,143,000
RDF facility					
73	112 ft by 73 ft building (estimated at \$23/ft ²)	1975	188,000	1.63	306,400
	Secondary shredder for pellet operations	1975	21,450	1.63	35,000
	Air classifier system	1976	310,000	1.55	480,500
	Fire protection sprinkler system	1976	12,300	1.55	19,100
	Dust collection system	1976	98,933	1.55	153,300
	Pellet mill No. 1	1976	53,000	1.55	82,200
	Pellet mill No. 2	1978	31,447	1.36	42,800
	Pellet mill No. 3	1980	51,804	1.14	59,100
	Trommel	1976	35,000	1.55	54,300
	Electrical controls	1976	20,000	1.55	31,000
	Conveyors	1977	11,000	1.46	16,100
	Secondary shredder for fine RDF*	1979	200,000	1.24	248,000
	Total: RDF facility		1,032,934		1,527,800
Total plant			9,448,719		16,670,800

* This shredder not part of dRDF pellet operation.

<u>RDF facility labor cost</u>	Total for year <u>(\$)</u>	Trommel at 3.55% <u>(\$)</u>
Operating labor	59,215	2,102
Maintenance labor	66,322	0
All indirect costs including supervision, administration, clerical, fringe benefits, and overhead costs (insurance, etc.)	112,537	<u>3,995</u>
	Total	\$6,097

Maintenance labor is not assigned to the trommel on a percentage basis because when the trommel required maintenance, labor hours associated with this work were recorded. This is discussed in Section 8.2.2.

8.2.1.2 Electric Power--

During the 12-month evaluation period of November 1980 through October 1981, the trommel operated for 2,906.1 h. Trommel motor power requirements were measured during the four test periods and averaged 4.14 kW at the lowest flow rates tested at 6 rpm rotational speed, which approximates the actual yearly trommel operation. Average electrical energy costs at the Baltimore plant were \$0.035/kW-h. Cost of electric power for the year is:

$$(2,906.1 \text{ h}) (4.14 \text{ kW}) (\$0.035/\text{kWh}) = \$421$$

8.2.2 Maintenance Costs

A log of the daily maintenance during the 1-year evaluation period is displayed in Appendix Table D-1. Table 8.2 is a summary of the maintenance by month. Maintenance required 312 h of plant labor costing \$2,449; \$500 for general plant supplies such as lubrication welding supplies, repair parts; \$1,960 for a new drive wheel and clutch assembly; and \$12,600 for an outside contractor to install a new drive ring.

Major maintenance problems were the lifter bars inside the trommel, the drive wheel, and the carrier ring. The trommel is designed with steel bars welded to the interior surface of the trommel to help lift and move the shredded refuse through the trommel. These bars become loose and must be rewelded from time to time, which accounts for most of the welding in January through March. Power to rotate the trommel is transmitted by a steel drive wheel in contact with a steel carrier ring around the outside of the trommel. The drive wheel becomes loose and must be periodically re-aligned and tightened. A new drive wheel assembly was installed in February. The carrier ring work hardened and finally had to be replaced in April 1981, which was the first carrier ring replacement since the trommel was installed in 1976. Installation of the new drive wheel and carrier ring had a major impact on maintenance costs. Maintenance labor hours through April and after April are as follows.

TABLE 8.2. MONTHLY TROMMEL MAINTENANCE

Month (1980)	Labor hours		Cost of materials (\$)	Activity
	Day shift	Night shift		
November	0	16	*	Lubrication; clean drive wheel.
December	0	20.5	*	Lubrication; install new set screws on loose drive wheel.
(1981)				
January	5	39	*	Lubrication; replace worn drive wheel and support wheel, weld broken lifter bars, screen, and carrier ring.
February	6	15.5	*	Weld broken lifter bar, drive wheel and stop plate.
			1,960	Install new drive wheel assembly and new clutches.
March	30	93	*	Weld broken carrier ring and screen. Fabricate and in- stall 1/2-in. steel plate structural supports inside trommel.
April	27	43	*	Same as March.
			12,600	New carrier ring fabricated and installed by outside contractor.
May	0	1	*	Lubrication.
June	0	0		
July	0	5	*	Lubrication.
August	0	0		
September	0	0		
October	0	10		Lubrication; tighten drive chain.
Total	69	243	15,060	
Total cost: Labor 312 h @ 7.85/h** = \$ 2,449				
Materials				15,060
				\$17,509

* Total cost of grease, oil welding rod, steel plate, and misc. parts estimated at \$500.

** \$7.85/h labor cost. Fringe benefits and overhead included in plant indirect cost category.

<u>Time period</u>	<u>Maintenance hours</u>	<u>Trommel operating hours</u>	<u>Ratio maintenance hours to operating hours</u>
November-April	296	1,505.3	0.20
May-October	<u>16</u>	<u>1,400.2</u>	0.01
	312	2,906.1	

Maintenance after April involved only lubrication and tightening a drive chain and trunnion wheel. In terms of maintenance labor required for operating hours, the installation of the new carrier ring resulted in a 95% reduction in maintenance labor.

The new drive wheel assembly and carrier ring replacement was the first such occurrence in the 5 years since operation began in 1976. If the test period had been in a year prior to 1981, the \$14,560 cost (\$1,960 drive wheel plus \$12,600 carrier ring installation) would not have appeared. Therefore, the \$14,560 cost has been amortized over the 5-year operating period using straight line amortization at \$2,912 per year. Maintenance labor is not amortized because the actual labor hours expended in installing the drive wheel assembly totaled only 11 h, which is relatively minor in comparison to the total 312 maintenance hours and labor for installation of the new carrier ring that was provided by an outside contractor. Total maintenance costs for the year are:

Maintenance labor: 312 h at \$7.85/h	\$2,449
Misc. repair parts and lubrication and welding supplies:	500
New drive assembly and carrier ring (\$14,560 ÷ 5 years):	<u>2,912</u>
	\$5,861

The total out-of-pocket cost (2,449 + 500 + 14,560) is \$17,509. However, the \$5,861 cost is a better value to use to derive a cost base for comparing trommel maintenance costs to other operations because the unusual cost of the drive and carrier ring is a cost that occurs only once per 5 years, based on experience to date.

8.3 ANNUAL PRODUCTION

8.3.1 Operating Hours and Production

The daily volume of product and the hours of operation are listed in Appendix Tables D-2 and D-3. During the 12-month evaluation period, November 1980 through October 1981, the trommel operated 2,906 h over 267 days for an average of 10.9 h/day (Table 8.3). During the same period, 2,027 Mg of dRDF pellets were shipped to Wright Patterson Air Force Base. Operating hours were recorded by an hour meter connected to the trommel drive motor circuit.

TABLE 8.3. MONTHLY OPERATION OF TROMMEL

Month	Days in operation	Hours in operation	Average operation (h/day)	dRDF pellets shipped (Mg)
<u>1980</u>				
November	21	236.1	11.2	191.94
December	20	153.8	7.7	0
<u>1981</u>				
January	19	246.2	13.0	298.58
February	23	300.3	13.1	321.72
March	25	312.4	12.5	343.93
April	19	256.5	13.5	134.22
May	22	221.0	10.0	135.97
June	23	148.3	6.4	0
July	22	225.9	10.3	249.31
August	24	252.3	10.5	0
September	25	285.9	11.4	265.69
October	<u>24</u>	<u>267.4</u>	<u>11.1</u>	<u>85.28</u>
Total	267	2,906.1	10.9	2,026.64

$$\text{Average processing rate} = \frac{2,026.64 \text{ Mg}}{2,906.1 \text{ h}} = 0.70 \text{ Mg/h.}$$

Unfortunately, the plant design did not provide for weighing the material flow streams either to or from the trommel or pellet mills. The trommeled RDF was fed directly to the pelleting operation. The amount of dRDF pellets produced was weighed only when the pellets were shipped from the plant. While a record of operating hours exists, a correlation of operating hours to Mg of dRDF cannot be made to arrive at an Mg/h value, except on a yearly basis. No dRDF pellets were in storage at the start of November or at the end of October, and the 2,027 Mg is representative of the year's operation.

The annual average processing rate of 0.7 Mg/h is low in comparison to the trommel's capacity because of the pellet mill operation. During the 1-year evaluation period, there was not a market for RDF; therefore, shredded MSW was conveyed to the RDF facility only when there was a need to run the pellet operation and produce dRDF. The trommel was sized to handle up to 38 Mg/h, which would provide 23 Mg/h to the pellet operation on the basis of a split of 40% fines removed by the trommel and 60% going to the secondary shredder and pellet mill. However, the pellet mills used had serious problems with jamming. When this occurred, the shredded MSW fed to the RDF plant was shut off and the shredded MSW that would have gone to the RDF plant was added to the shredded MSW going to landfill. Because unjamming of the pellet mill was an operation that normally did not require a full day, the RDF plant equipment, including the trommel, was kept in operation so that once the pellet mill was unjammed, shredded MSW flow could commence and pelleting resume. Thus, the flow through the trommel could be started and stopped several times during the day but the trommel kept rotating. The net result is that total operating hours are high and total material weight processed is low.

Plant personnel estimate that the pellet operations average less than 0.9 Mg/h (1 ton/h), which confirms the measured 0.7-Mg/h value. Actual instantaneous flow rates would, of course, be much higher because the annual rates include all the pellet mill downtime. Plant personnel estimate that when material is actually flowing through the trommel, the normal feed-rate is 7 to 13 Mg/h. Normal operating speed is 6 rpm, and the average percent of the infeed going to the pellet operation (oversize) at 6 rpm and within this infeed range is 54.2%, which is close to the nominal 60% oversize split assumed for the trommel. Therefore, the 0.7-Mg/h pellet feed converts to 1.3-Mg/h infeed to the trommel. Assuming an average instantaneous rate of 10 Mg/h (average 7 to 13 Mg/h) trommel infeed rather than the annual 1.3 Mg/h rates indicates the trommel was running empty 87% of the time.

The plant day shift began at 7:00 a.m. and continued until 5:00 p.m., a total of 10 h. Average operating hours were 10.9 h/day. Processing operations were not stopped during the lunch break, as the plant personnel took staggered lunch breaks. The trommel obviously was operated briefly during the evening maintenance shift (5:00 p.m. to 1:30 a.m.), and there were several days when the trommel was operated during the night shift to meet the dRDF production requirements.

For cost normalization purposes, the usual method is to express cost in terms of the weight of product produced as \$/Mg. As the above discussion shows, the amount of dRDF pellets produced is not indicative of the total trommel operation. For example, wear on the drive components is primarily a function of operating hours; therefore, operating hours must also be considered in any cost normalization calculations.

8.3.2 Availability

The trommel operated consistently over the year as indicated by the 267 days in operation and an average of over 10 h/day (Table 8.3). A comparison of trommel availability (Table 8.4) shows the trommel was available 97% of the work days compared to 89% for the balance of the RDF plant.

Analysis of the maintenance log (Appendix Table D-1) shows that the bulk of the maintenance was accomplished during the evening shift after 5:00 p.m.; thus, daily operation was not disturbed. For 9 days, maintenance was performed on the trommel during the full day shift, and this time is charged against the trommel as downtime. On two occasions, maintenance was performed on the trommel for 2 to 3 h during the day shift. In one case, the plant did not operate at all that day; in the other case, the plant did operate, so these days were not charged against the trommel. On one other day, trommel maintenance was done on a Sunday. This also was not charged as a trommel down day because the plant would not normally have operated on a Sunday. All nine trommel down days involved repair or replacement of the drive ring. Once this ring was replaced in April, no further down days occurred.

8.4 TOTAL COST

Total cost to operate the trommel is composed of the yearly depreciation value of the capital required to install the trommel and the operating and maintenance costs. A 10-year depreciation period is used as this is the IRS-recommended period for resource recovery plants.⁵ The allowable IRS depreciation range is 8 to 12 years with 10 years as the recommended midpoint. A variety of depreciation formulas may be used, depending upon the particular circumstances involved. In this study of the trommel screen, straight line depreciation is used since it is the simplest formula, yielding 10% per year for 10 years. Plant operators with different depreciation schedules who wish to apply the trommel costs calculated in this report to their facilities can easily recalculate the yearly depreciation values. Total costs for the trommel, based on this 1-year study from November 1980 through October 1981, expressed in 1981 dollars, are:

TABLE 8.4. TROMMEL AND RDF PLANT AVAILABILITY

Month	Days RDF plant available for operation*	Days downtime		Total RDF plant	Days RDF plant in operation
		Trommel	Balance of RDF plant		
<u>1980</u>					
November	25	0	4	4	21
December	26	0	6	6	20
<u>1981</u>					
January	26	0	7	7	19
February	24	0	1	1	23
March	26	1	-	1	25
April	26	8	-	8	18
May	26	0	4	4	22
June	25	0	2	2	23
July	26	0	4	4	22
August	26	0	2	2	24
September	25	0	0	0	25
October	<u>27</u>	<u>0</u>	<u>3</u>	<u>3</u>	<u>24</u>
Total Days	308	9	33	42	266
% Availability**		97.1	89.3	86.7	

* Includes Saturday and excludes Sundays and six holidays.

** Availability.

$$\text{Trommel} = \frac{\text{days trommel operated}}{\text{days available for trommel}} = \frac{\text{days trommel operated}}{\text{plant available days} - \text{balance of plant downtime}}$$

$$\% = \frac{266}{308-33} \times 100 = \underline{96.7\%}$$

$$\text{Balance of RDF plant} = \frac{\text{days plant would have operated if not for trommel}}{\text{days available for plant}}$$

$$= \frac{\text{plant available days} - \text{balance of plant downtime}}{\text{plant available days}}$$

$$\% = \frac{308-33}{308} \times 100 = \underline{89.3\%}$$

$$\text{Total plant} = \frac{\text{days plant operated}}{\text{days available for plant}}$$

$$\% = \frac{266}{308} \times 100 = 86.4$$

Item	Yearly cost	
	\$	% of Total
Capital depreciation (10% of \$54,300)	5,430	30.5
Operating costs		
Direct operating labor	\$2,102	
Supervision, clerical, fringe benefits, overhead, and all other indirect costs	3,995	
Electric power	<u>421</u>	6,518
Maintenance costs		36.6
Maintenance labor	2,449	
Parts, supplies, and outside contractor	<u>3,412</u>	5,861
Total yearly cost	\$17,809	<u>32.9</u> 100.0

The total \$17,809 annual cost is relatively evenly divided among the three categories of capital depreciation, operating costs, and maintenance costs.

The cost normalization ratios are:

$$\text{Hourly cost} = \frac{\$17,809 \text{ yearly cost}}{2,906.1 \text{ annual operating hours}} = \$6.13/\text{h}$$

$$\text{Produce cost} = \frac{\$17,809 \text{ yearly cost}}{2,026.64 \text{ Mg dRDF produced}} = \$8.79/\text{Mg of dRDF}$$

$$\text{Trommel infeed} = \frac{\$17,809 \text{ yearly cost}}{\frac{2,026.64 \text{ Mg dRDF produced}}{0.542 \text{ oversize split}}} = \$4.76/\text{Mg of trommel infeed}$$

The above \$/Mg costs are higher than would have occurred had the pellet operation had a higher average flow rate. Also, if the trommel were being installed now to meet the known pellet system flow rate, a smaller trommel with resulting lower cost might be installed. In either case, the \$/Mg cost would be lower.

Assuming that maintenance costs would not increase substantially with increased throughput, then a cost can be derived for trommel operating conditions with higher average flow rates. Trommel efficiency, ash and moisture removal, organic quality improvement, and heating value improvement

tend to decrease with increasing flow rate. If the 10 Mg/h average instantaneous infeed rate is selected as a potential yearly rate, then yearly costs would be:

$$\text{Potential cost} = \frac{\$17,809 \text{ yearly cost}}{(2,906.1 \text{ operating h}) (10 \text{ Mg/h})} = \$0.61/\text{Mg of trommel infeed}$$

Of course, the trommel could be operated at much higher flow rates, thus reducing the \$/Mg cost even more; however, the associated sacrifices in screening efficiency would probably be unacceptable. The 10 Mg/h is a more reasonable value to use for cost comparisons, as it is approximately the highest processing rate at which optimum product quality is achieved.

In terms of dRDF produced at 54.2% of the trommel infeed, the above potential processing rate yields 5.42 Mg/h of dRDF and the cost for dRDF is:

$$\text{Potential cost} = \frac{\$17,809 \text{ yearly cost}}{(2,906.1 \text{ operating hours}) (5.42 \text{ Mg/h})} = \$1.13/\text{Mg of dRDF}$$

The following comparison of these various ratios shows that while the trommel actual cost was \$8.79/Mg of dRDF pellets produced, the trommel has the capability to achieve \$1.13/Mg or lower of dRDF total cost.

<u>Flow rate</u>	<u>Unit</u>	<u>Actual</u>	<u>Potential</u>
Trommel Infeed	Mg/h	1.3	10
dRDF Produced	Mg/h	0.70	5.42
<u>Cost ratio</u>			
Hourly	\$/h	6.13	6.13
dRDF	\$/Mg of dRDF	8.79	1.13
Infeed	\$/Mg of trommel infeed	4.76	0.61

8.5 ECONOMIC CONTRIBUTION OF TROMMEL SCREEN

8.5.1 Meeting Product Specifications

The purpose of the trommel is to improve fuel quality by removing non-combustibles so that fuel specifications can be met. The trommel oversize material is fed to the secondary shredder and then to the pellet mill for production of dRDF pellets. Pellet specifications are:

	<u>As received</u>	<u>Oven dry basis</u>
Minimum heating value	-	15,120 kJ/kg (6,500 Btu/lb)
Maximum ash content	-	15%
Maximum moisture content	20%	-
Minimum bulk density at 20% moisture	561 kg/m ³ (35 lb/ft ³)	
Maximum fines	5%	

The percent fines and bulk density do not apply to the trommel oversize, as these properties are changed by the pelleting process. Also, moisture content of the pellets would be somewhat lower than the trommel oversize moisture content because the pellets are heated by the frictional resistance of the material being moved through the pellet mill die. Thus, some moisture content would be lost due to increased temperature of the RDF. The heating value and ash content specifications, however, do apply to the trommel oversize as there is no processing between the trommel and the pellet operation that would change either the dry basis heating value or the ash content.

A review of the properties of the RDF fed to the trommel (Appendix C Tables) shows that the percent dry basis ash is in most cases above 15%. Ash values are usually in the 20 to 30% range. In only 3 tests of the total 60 tests conducted is the trommel feed dry basis ash content below 15%. Dry basis heating value of the feed material is usually above the 15,120 kJ/kg (6,500 Btu/lb) specification, there being only 5 tests of the 30 heating value tests that fall below this specification. While heating value is not a serious problem for the Baltimore case, the RDF before trommeling cannot meet the ash content fuel specifications. For the RDF to have an economic value, screening or some form of processing to remove ash is necessary.

Figures 8.1 and 8.2 show the oversize dry basis heating value and ash content. In only one case does heating value drop below the fuel specification limit, and this occurred at a feedrate higher than that at which the plant would normally operate. The majority of the oversize heating values fall within an 18,000 to 21,000 kJ/kg range, well above the 15,120 kJ/kg fuel specification. Plant practice is to operate within a 7 to 13 Mg/h feedrate. Below 13 Mg/h, the large majority of ash values are below 15% but in at least 5 tests values were above 15%. While limiting the feedrate will not necessarily guarantee ash below 15%, operating at 13 Mg/h or below will increase the probability of meeting fuel specifications.

There is an expected trend (Figure 8.3) of increasing dry basis heating value with decreasing ash content. This figure demonstrates that the trommel has an impact on increasing the dRDF energy content through ash removal.

Figure 8.1. Oversize Heating Value Compared to Fuel Specification.

Figure 8.2. Oversize Ash Content Compared to Fuel Specification.

Figure 8.3. Oversize Heating Value Versus Ash Content.

The net result is that with some exceptions, the trommel does remove sufficient ash, and heating value is sufficiently high to meet fuel specifications. Without the trommel the dRDF produced could not be sold; therefore, the trommel makes an economic contribution. This does not rule out considerations such as changing fuel specifications or other processing steps besides trommeling. However, in the specific process flow scheme at Baltimore, the trommel is used to provide the necessary processing step of reducing ash and increasing heating value.

8.5.2 Economic Measure

Section 7.0 discussed a variety of parameters used to measure trommel performance such as ash and moisture content removal and organic quality improvement, all of which result in heating value improvement. There were positive results in all these parameters with improvements tending to decrease with an increase in infeed flow rate. The plant operators have chosen through experience an average 10 Mg/h (7 to 13 Mg/h range) flow rate as one that produces adequate fuel quality. Once it has been established that the trommel is necessary to remove ash to meet fuel specifications, then the only parameter that has a definite economic measure is heating value, as the \$/Mg at a specified kJ/kg heating value can easily be converted to \$/kJ of energy.

For the Baltimore operation shredded MSW is normally landfilled after magnetic ferrous removal. Any RDF that can be sold is a reduction in landfill costs. During the year's evaluation period, only a market for dRDF existed and the market volume was much less than the volume of shredded MSW available for processing. Thus, the fact that a large percentage of the trommel infeed resulted in undersize that was sent to landfill is of no economic consequence in the Baltimore case. What is important is that some material that otherwise would go to landfill is sold. Therefore, an economic model that applies the cost of energy lost in the undersize material is not appropriate for the Baltimore case.

Heating value is improved by the trommel as the heating value of the oversize is always greater than the heating value of the infeed. The most straightforward economic model for the Baltimore trommel is to compare the dollar value of the heating value increase to the total trommel cost. Revenues from the sale of dRDF and reduction in landfill costs would need to be assigned to the total RDF facility, including the air classifier, secondary shredder, and pellet mill. Therefore, the economic credit due the trommel is only what heating value improvement results due to trommeling.

Heating values were measured during the October 1980 and the May 1981 test series. During all 30 tests, there was an improvement in heating value due to the trommel. The sale price of the dRDF pellets, FOB the Baltimore plant was \$29.76/Mg (\$27/ton) and the fuel specification was 15,119 kJ/kg (6,500 Btu/lb) dry basis. The value of the energy is then:

$$\frac{\$29.76/\text{Mg}}{15,119 \text{ kJ/kg} \times 1,000 \text{ kg/Mg}} = \$1.968/10^6 \text{ kJ dry basis (equivalent to } \$2.08/10^6 \text{ Btu)}$$

Therefore, the increase in dry basis kJ/kg heating value can be assigned a dollar value. The total cost of the trommel was previously determined to be \$6.13/h, including capital depreciation, operations, and maintenance. The net economic contribution of the trommel is, then, the value of the heating value increase less the trommel cost. Computational formulas are:

$$\$hvi = \frac{\text{kJ/kg increase} \times \$1.968/10^6 \text{ kJ}}{\text{Mg}/10^3 \text{ kg}} = \$/\text{Mg}_{hvi}$$

$$\$tc = \frac{\$6.13/\text{h total cost}}{\text{Mg/h infeed} \times \text{weight split oversize/infeed}} = \$/\text{Mg}_{tc}$$

$$\text{Economic contribution of trommel} = \$/\text{Mg}_{tc}$$

$$hvi = \text{dry basis heating value increase in } \$/\text{Mg} \text{ of oversize to pellet operations}$$

$$tc = \text{trommel total cost in } \$/\text{Mg} \text{ of oversize to pellet operations}$$

This method of determining the trommel economic contribution is based not on the pellet system capability, but on the capability of the trommel and takes into account the variables of percentage of the infeed that becomes overs and all the parameters that improve heating value. These variables change with infeed rate; thus, the trommel economic contribution is calculated over the entire operating range tested. Results are listed in Appendix Table D-4. The effects of feedrate and rotational speed are shown in Figure 8.4.

The four tests that exceeded the ash content specification and the one test that exceeded the heating value specification during the May 1981 test series are not shown in Figure 8.4. While an economic contribution could be calculated for these test conditions, it would not apply because the product does not meet specifications.

As expected, the characteristics of the oversize material are quite variable because of the wide variability in the MSW delivered to the plant. Therefore, the heating value increase and its resultant dollar value has a great deal of variability. When trommel costs are expressed in \$/Mg, it is expected that low feedrates would result in low or negative economic contribution by the trommel because, with a low Mg/h feedrate, the trommel cost is a high \$/Mg value. Figure 8.4 shows that this can be true at feedrates below \$5/Mg/h, but there are also exceptions due to large heating value increases in some tests at these low flow rates. The conclusion reached is

Figure 8.4. Economic Contribution of the Trommel.

that to prevent the possibility of a negative economic contribution occurring, the trommel should be operated above 5 Mg/h, plus a safety factor. This conclusion agrees quite well with the plant operating experience of a 7-Mg/h minimum flow rate.

Maximum feedrate limits to keep the economic contribution optimized is not well defined from the test data. The economic contribution is \$4/Mg or above if feedrates exceed 7 Mg/h until feedrates reach 24 Mg/h. At the higher flow rates 6 rpm results in poorer performance. Plant experience is to keep feedrates below 13 Mg/h to reduce the probability of exceeding ash content specifications. Figure 8.4 indicates that keeping feedrates within a range of 7 to 13 Mg/h insures the optimum economic contribution. Within this feedrate economic contribution averages \$6.26/Mg and ranges from \$4.80 to \$8.50/Mg.

Figure 8.4. Economic Contribution of the Trommel.

9.0 REFERENCES

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GLOSSARY

Air-Classified Light Fraction (ACLF) - that part of the infeed to an air classifier that is carried away by the airstream.

Air-Dry Moisture Content - the weight lost during drying of the material in ambient air divided by the initial weight of the material. Air drying is typically carried out at 25 to 27°C.

Air-Dry to Oven-Dry Moisture Content - the weight lost during oven drying of a previously air-dried material divided by the weight of the air-dry material.

Aperture Size - the size of an opening in the screen. For circular apertures, the aperture size is equal to the diameter of the circle. For square apertures, the aperture size is equal to the length of one side of the square.

As-Received - the condition of material at the time of sample collection (i.e., prior to any changes such as drying).

Ash Content - the weight fraction of a sample of material which is not volatilized at a temperature of 700°C.

Ash Content Removal - the percentage change of the ash content during the course of screening in relation to the ash content of the feed (the ash content of the feed minus the ash content of the oversize fraction, and that quantity divided by the ash content of the feed).

Ash/Energy Content - the mass of ash produced per unit of energy obtained by direct combustion (e.g., kg ash/GJ or lb ash/MMBtu).

Bed Depth - the depth of material on the screen. For material in kiln action, the bed depth is generally taken at the center of the material.

Bulk Density - the mass per unit volume of an uncompacted porous media. Determined by filling a container of known volume with the material of interest, while avoiding compaction, and then measuring the weight of the material.

Centrifugal Action - the motion of material in a trommel which is characterized by the material being carried by means of centrifugal force above the horizontal plane that passes through the center of the screen until at some point it detaches from the screen and falls. Distinct from kiln action.

Characteristic Size - the particle size that corresponds to 63.2 ($1 - \frac{1}{e}$) cumulative weight percent passing in a particle distribution. Concept of characteristic size is from the Rosin-Rammler distribution.

Component Distribution - the material composition of a sample.

Component/Size Class - a class of material that is composed solely of a certain material component (e.g., paper, glass) and is characterized by a particular range of particle sizes.

Critical Speed - the rotational speed at which the resulting centrifugal force prevents material from falling from the inner surface of the screen. As a consequence, the screen and material rotate as a flywheel.

dRDF - densified refuse derived fuel.

Dry Basis - value of a measured parameter expressed in terms of the oven-dry sample which contains no free moisture.

Energy Recovery - the fraction of calorific energy contained in the material input to a screening operation which is retained in the oversize fraction. The energy recovery is equal to the heating value of the oversize fraction, times the mass fraction of the feed reporting to the oversize fraction, divided by the heating value of the feed material.

Feedrate - mass of material injected into a trommel per unit of time. Also referred to as mass flow rate and mass throughput. During steady-state operation, the feedrate is equal to the undersize flow rate plus the oversize flow rate.

Heating Value - the thermal energy released during combustion of a material per unit of mass of the material. In this report, the reported values are the higher heating values. That is, in the determination of the heating value, no energy is consumed in vaporizing the moisture contained in the material.

Heating Value Improvement - the heating value of the oversize fraction divided by the heating value of the feed. Expressed on a percentage basis.

Holdup Fraction - the fraction of the internal volume of a trommel screen which is occupied by material.

Inclination Angle - the angle between horizontal and the longitudinal axis of the trommel.

Inorganic Other - noncombustible materials other than iron-based metal, aluminum, and glass. In MSW, it includes mainly bones, nonferrous and non-aluminum metals, rocks, and sand.

Kiln Action - the motion of material in a trommel which is characterized by the absence of freefalling particles. In kiln action, particles slide or roll down the slope formed by particles which are being lifted by the screen.

Leading Edge Time - the residence time of the initial portion of material that enters an empty, rotating screen. Determined by measuring the time required for the initial material falling into the screen from the feed conveyor to traverse the length of the screen and exit in a uniform front. The few particles that are dispersed forward of the leading edge are ignored.

Lifters - internal elements of a rotating cylinder that serve to carry the material up to a point at which the material falls off the surface. Lifters generally extend the entire length of a trommel and may be constructed in a variety of shapes, including straight bars, notched bars, and cups.

Moisture Content - the weight fraction of a sample of material which is water. (See definitions of air-dry moisture content, air-dry to oven-dry moisture content, oven-dry moisture content, and total moisture content.)

Moisture Content Removal - the percentage change of the moisture content during the course of screening in relation to the moisture content of the feed (the moisture content of the feed minus the moisture content of the oversize fraction, the quantity divided by the moisture content of the feed).

MSW - municipal solid waste.

Nominal Size - the particle size that corresponds to 90.0 cumulative weight percent passing in a particle distribution.

Open Area Fraction - the fraction of the total screen surface area that is comprised of openings in the screen.

Organic Content - the weight fraction of a sample which consists of organic materials.

Organic Other - combustible material which is not paper or plastic. In MSW, it includes mainly food waste, yard waste, and textiles. Synthetic fibers are often included in this category because of the difficulty in distinguishing them from natural fibers.

Organic Quality - equals organic content.

Organic Quality Improvement - the change in the organic quality of the material after traversing the length of the screen. Determined by dividing the organic quality of the oversize fraction by the organic quality of the feed. Expressed on a percentage basis.

Organic Recovery - the weight fraction of the organic material in the in-feed which reports to the oversized fraction.

Oven-Dry Moisture Content - the total moisture content of a material dried in an oven at 100 to 105°C as referenced to its initial weight before any drying has occurred.

Oversize Flow Rate - mass of material reporting to the oversize fraction per unit of time.

Oversize Fraction - material which does not pass through the apertures of a screen while traversing the length of the screen. Also referred to as "overs." Distinct from "true oversize" in that some undersize material may not penetrate the screen apertures while the material traverses the length of the screen.

Oversize Split - the weight fraction of the trommel feed material that reports to the oversize fraction.

Particle Size - determined as the size of the smallest aperture that a particle can pass through.

Post-Trommel - a trommel screen which is used to process material following a comminution stage (e.g., a trommel used to process the air-classified light fraction).

Pre-Trommel - a trommel screen which is used to process raw MSW which has not been otherwise processed.

Probability of Passage - the probability of a particle passing through an aperture in the screen upon contact with the plane of the screen surface. The plane of the screen surface is defined as the plane tangential to the screen surface and passing through the screen at the point of contact.

Raw MSW - MSW which has not been processed.

RDF - refuse derived fuel.

Recovery Factor - the weight fraction of feed material to a unit process which reports to a given output stream from the unit process.

Residence Time - time required for a particle to traverse the entire length of a screen. Particles which pass to the undersized fraction are not included in this definition.

Screening Efficiency - the fraction of undersized material in the infeed which reports to the undersized fraction during screening.

Screening Rate - the fraction of undersized material in a screen or specified section of a screen which passes to the undersized fraction during a unit of time or during the time in which the material progresses a unit of axial distance along the screen. Also referred to as "screening rate per unit of distance or per unit of time."

Size Class - a class of material that is characterized by a particular range of particle sizes. A size class is determined by all of the material passing through a given size screen (the upper limit of the size class) and none of the material passing through a given smaller size screen (the lower limit of the size class). Size class is also referred to as "size fraction."

Specific Power - the power consumption of a unit or system expressed upon a basis of the feed rate processed. Alternatively formulated in terms of "specific energy."

Split - the trommel feed material which reports to a given output stream. (See recovery factor.)

Total Moisture Content - equals oven-dry moisture content.

Tracer Time - the residence time determined by measuring the time required for a given tracer material to traverse the length of the screen.

Trommel (from the German for "drum") - a cylindrically shaped screen in which the motion of particles is imparted through rotation of the screen and through an inclination of the screen from the horizontal.

True Oversize - material which cannot, because of its size, pass through the apertures of a screen. Also referred to as "actual oversize" or "oversize material." Distinct from "oversize fraction."

True Undersize - material which would pass through the apertures of a screen if ideally oriented in space and if the aperture were not blocked. Also referred to as "actual undersize" and "undersize material."

Undersize Flow Rate - mass of material passing through the screen apertures per unit of time.

Undersize Fraction - material which passes through the apertures of a screen while traversing the screen. Also referred to as "unders." Distinct from "true undersize" in that some true undersize may not report to the undersize fraction during screening.

Undersize Split - the weight fraction of the trommel feed material that reports to the undersize fraction.

APPENDIX A

DETAILED SAMPLING PROCEDURE

TEST PROCEDURE

Event

Direct all flow from belt 14 to compactor. Leave all equipment downstream of belt 14 running.

Position secondary recovery (SR) output diverter to direct SR output into SR input. Verify that no material on belt 17 (except trommel unders) reaches belt 18. Alternatively, have belt No. 17 off and let all air classifier heavies collect in bottom hopper for the duration of the test run.

Verify that all belts and equipment downstream of belt 14 are empty.

Direct flow from belt 14 to belt 15.

Rake back dribble of material from cyclones until full flow occurs.

Note entrance of leading edge into trommel and begin timing T_{R1} .

Insert tracers into feed and begin timing T_{R2} .

Finish timing of T_{R1} and T_{R2} upon exit of leading edge and first tracer.

Place markers on belts 21 and 18 to indicate beginning of sampling period. Begin T_s (sampling time). Stop belt 18. Then proceed to repetitiously start and stop it until end of sampling period.

Upon signal, sweep all material from compactor, sweep overs from compactor.

When belt 18 is full (or when it is otherwise decided that enough material has been collected), signal end of sampling period. Simultaneously stop belts 17, 18, and 20 and the trommel (which causes belt 21 to stop), and stop time T_s .

Stop belts 15 and 19 and redirect all flow from belt 14 to compactor. Also, stop all SR belts.

Duties of Individual Controlling Flow Rate

Receive signal from 2a indicating that all belts are clear and all personnel are at their stations.

Signal via TV monitor at air classifier inlet (belt) to control room to open diverter. Continue to signal until diverter is set to permit desired flow rate.

Go to brush at heavies 2 belt (belt 17) and, upon signal from 2a, position brush to divert heavies to SR.

Proceed to control room and assist in final shutoff.

Duties of Individuals in RDF Compactor

Two people are required.

One must be within sight of 2a. The other is stationed inside of compactor and sweeps all material from it until the first man relays signal from 2a indicating that sampling period is beginning. Upon receiving this signal, any material in compactor is jettisoned and subsequent incoming material is saved for analysis.

Station 1: Trommel Infeed

Verify that belts 19 and 20 are running and that the belts are empty. Signal to 2a if all is ready.

Rake back the dribble of material from cyclones on belt 19 until full flow occurs. A distinct leading edge is desirable, but an excessively high "wall" of material is undesirable.

Upon entrance of leading edge into the trommel, signal 2a to begin timing T_{R1} . After waiting 30 seconds from when the leading edge enters the trommel, insert tracer cards into the feed. When the cards enter the trommel, signal 2a to begin timing T_{R2} .

Climb down to ground level. Watch 2a for signal that sampling period has started.

When signal is given, go to trommel switchgear and read and record trommel motor voltage and amperage.

Assist in collecting and weighing the sample material.

Procedure Station 2a: (Overs Belt)

Signal to man at air classifier feed belt (belt 15) to begin flow.

Watch for signal from Station 1 (trommel inlet) indicating entrance of leading edge. Begin T_{R1} .

Approximately 30 seconds later watch for signal from Station 1 indicating entrance of tracers. Begin T_{R2} .

Approximately 20 seconds later signal to man at heavies 2 belt (belt 17) to activate brush scraper. The timing for this is dictated by the requirement that all heavies which have passed the brush should have time to be transferred to the heavies 3 belt (belt 18) before the commencement of the sampling period.

Watch for appearance of leading edge and tracers. Terminate T_{R1} and T_{R2} .

Signal beginning of sampling period to 2b and man taking power measurements by dropping bag onto RDF belt (belt 21).

Just before bag falls into RDF compactor, signal to man by RDF compactor to sweep out compactor.

Station 2b: Trommel Exit (Unders Belt)

Upon signal from 2a, simultaneously begin T_s , drop marker onto belt 18. Signal to 3 to stop belt 18, and continue indicating when to start and stop it until end of run.

When belt 18 is full, and as marker approaches entrance to chute at downstream end of belt, simultaneously end T_s , indicate final stop to 2a and 3, and drop marker onto belt 18.

Prior to initiation of run, person from this station opens and lays out 8 sample bags and 8 bag ties, and prepares duplicate sample labels for each of the 4 samples. After the run, this person, with assistance from Station 1 person, collects the materials on the unders belt and assists in bulk density weighings, sample quartering, sample collection, and sample labeling.

APPENDIX B

COMPONENT SIZE DISTRIBUTIONS

TABLE B-1. COMPONENT/SIZE DISTRIBUTION (6 rpm, feedrate = 1.76 Mg/h (1.94 tons/h), October 1980)
(% by weight)

mm	Size class* in.	Material	Paper & plastic	Organic -other-	Nonferrous	Ferrous	Glass	Inorganic other	Fines (-1.30 mm)	Total
+76.20	+3	Feed	4.39	0.00	0.00	0.00	0.00	0.00	0.00	4.39
		Overs	12.11	0.00	0.00	0.00	0.00	0.00	0.00	12.11
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-76.20 + 50.80	-3 + 2	Feed	12.79	0.06	0.00	0.00	0.00	0.00	0.00	12.85
		Overs	35.25	0.15	0.00	0.00	0.00	0.00	0.00	35.40
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-50.80 + 25.40	-2 + 1	Feed	11.10	0.30	0.00	0.00	0.00	0.00	0.00	11.40
		Overs	30.60	0.82	0.00	0.00	0.00	0.00	0.00	31.42
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-25.40 + 31.75R	-1 + 1-1/4R	Feed	0.78	0.03	0.00	0.00	0.00	1.98	0.00	2.79
		Overs	2.04	0.07	0.00	0.00	0.00	0.00	0.00	2.11
		Unders	0.06	0.00	0.00	0.00	0.00	3.10	0.00	3.16
-31.75R + 15.88	-1-1/4R + 5/8	Feed	7.43	0.30	0.00	0.00	0.00	0.00	0.00	7.73
		Overs	11.71	0.76	0.00	0.00	0.00	0.00	0.00	12.47
		Unders	5.00	0.04	0.00	0.00	0.00	0.00	0.00	5.04
-15.88 + 1.30	-5/8 + 0.051	Feed	30.69	2.33	0.15	0.00	4.70	1.77	0.00	39.64
		Overs	4.92	0.16	0.00	0.00	0.00	0.00	0.00	5.08
		Unders	45.37	3.57	0.24	0.00	7.37	2.78	0.00	59.33
-1.30	-0.051	Feed	0.00	0.00	0.00	0.00	0.00	0.00	21.20	21.20
		Overs	0.00	0.00	0.00	0.00	0.00	0.00	1.41	1.41
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	32.47	32.47
Total	-	Feed	67.18	3.02	0.15	0.00	4.70	3.75	21.20	100.00
		Overs	96.63	1.96	0.00	0.00	0.00	0.00	1.41	100.00
		Unders	50.43	3.61	0.24	0.00	7.37	5.88	32.47	100.00

* R designates round sieve opening.

TABLE B-2. COMPONENT/SIZE DISTRIBUTION (6 rpm, feedrate = 3.13 Mg/h (3.44 tons/h), October 1980)
(% by weight)

Size class*		Material	Paper & plastic	Organic other	Nonferrous	Ferrous	Glass	Inorganic other	Fines (-1.30 mm)	Total
mm	in.									
+76.20	+3	Feed	6.69	0.00	0.00	0.00	0.00	0.00	0.00	6.69
		Overs	13.53	0.00	0.00	0.00	0.00	0.00	0.00	13.53
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-76.20 + 50.80	-3 + 2	Feed	12.51	0.00	0.00	0.00	0.00	0.00	0.00	12.51
		Overs	25.31	0.00	0.00	0.00	0.00	0.00	0.00	25.31
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-50.80 + 25.40	-2 + 1	Feed	17.42	0.57	0.90	0.00	0.00	0.00	0.00	18.89
		Overs	35.24	1.14	1.81	0.00	0.00	0.00	0.00	38.19
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-25.40 + 31.75R	-1 + 1-1/4R	Feed	0.74	0.09	0.00	0.00	0.00	0.00	0.00	0.83
		Overs	1.44	0.19	0.00	0.00	0.00	0.00	0.00	1.63
		Unders	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.06
-31.75R + 15.88	-1-1/4R + 5/8	Feed	7.39	0.49	0.00	0.00	0.00	0.00	0.00	7.88
		Overs	10.90	0.45	0.00	0.00	0.00	0.00	0.00	11.35
		Unders	3.95	0.53	0.00	0.00	0.00	0.00	0.00	4.48
-15.88 + 1.30	-5/8 + 0.051	Feed	27.91	3.94	0.32	0.00	0.68	0.20	0.00	33.05
		Overs	7.08	1.17	0.23	0.00	0.00	0.00	0.00	8.48
		Unders	48.27	6.66	0.42	0.00	1.34	0.41	0.00	57.10
-1.30	-0.051	Feed	0.00	0.00	0.00	0.00	0.00	0.00	20.15	20.15
		Overs	0.00	0.00	0.00	0.00	0.00	0.00	1.51	1.51
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	38.36	38.36
Total	-	Feed	72.66	5.09	1.22	0.00	0.68	0.20	20.15	100.00
		Overs	93.50	2.95	2.04	0.00	0.00	0.00	1.51	100.00
		Unders	52.28	7.19	0.42	0.00	1.34	0.41	38.36	100.00

* R designates round sieve opening.

TABLE B-3. COMPONENT/SIZE DISTRIBUTION (6 rpm, feedrate = 4.74 Mg/h (5.21 tons/h), October 1980)
(% by weight)

Size class*		Material	Paper & plastic	Organic other	Nonferrous	Ferrucous	Glass	Inorganic other	Fines (-1.30 mm)	Total
mm	in.									
+76.20	+3	Feed	5.89	0.08	0.00	0.00	0.00	0.00	0.00	5.97
		Overs	20.07	0.28	0.00	0.00	0.00	0.00	0.00	20.35
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-76.20 + 50.80	-3 + 2	Feed	5.77	0.08	0.00	0.00	0.00	0.00	0.00	5.85
		Overs	19.66	0.29	0.00	0.00	0.00	0.00	0.00	19.95
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-50.80 + 25.40	-2 + 1	Feed	9.26	0.54	0.00	0.00	0.00	0.00	0.00	9.80
		Overs	31.52	1.83	0.00	0.00	0.00	0.00	0.00	33.35
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-25.40 + 31.75R	-1 + 1-1/4R	Feed	0.69	0.02	0.00	0.00	0.00	0.00	0.00	0.71
		Overs	2.06	0.05	0.00	0.00	0.00	0.00	0.00	2.11
		Unders	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.12
-31.75R + 15.88	-1-1/4R + 5/8	Feed	7.86	2.66	0.00	0.00	0.00	0.00	0.00	10.52
		Overs	13.46	1.12	0.00	0.00	0.00	0.00	0.00	14.58
		Unders	5.53	3.30	0.00	0.00	0.00	0.00	0.00	8.83
-15.88 + 1.30	-5/8 + 0.051	Feed	43.17	5.36	0.55	0.26	5.79	0.84	0.00	55.97
		Overs	7.12	1.43	0.00	0.00	0.03	0.03	0.00	8.61
		Unders	58.17	6.99	0.77	0.37	8.19	1.17	0.00	75.66
-1.30	-0.051	Feed	0.00	0.00	0.00	0.00	0.00	0.00	11.18	11.18
		Overs	0.00	0.00	0.00	0.00	0.00	0.00	1.05	1.05
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	15.39	15.39
Total	-	Feed	72.64	8.74	0.55	0.26	5.79	0.84	11.18	100.00
		Overs	93.89	5.00	0.00	0.00	0.03	0.03	1.05	100.00
		Unders	63.82	10.29	0.77	0.37	8.19	1.17	15.39	100.00

* R designates round sieve opening.

TABLE B-4. COMPONENT/SIZE DISTRIBUTION (6 rpm, feedrate = 12.84 Mg/h (14.12 tons/h), October 1980)
(% by weight)

Size class*		Material	Paper & plastic	Organic other	Nonferrous	Ferrous	Glass	Inorganic other	Fines (-1.30 mm)	Total
mm	in.									
+76.20	+3	Feed	4.38	0.00	0.00	0.00	0.00	0.00	0.00	4.38
		Overs	9.23	0.00	0.00	0.00	0.00	0.00	0.00	9.23
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-76.20 + 50.80	-3 + 2	Feed	8.11	0.00	0.00	0.00	0.00	0.00	0.00	8.11
		Overs	17.09	0.00	0.00	0.00	0.00	0.00	0.00	17.09
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-50.80 + 25.40	-2 + 1	Feed	9.51	0.92	0.00	0.00	0.00	0.00	0.00	10.43
		Overs	20.06	1.95	0.00	0.00	0.00	0.00	0.00	22.01
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-25.40 + 31.75R	-1 + 1-1/4R	Feed	2.93	0.00	0.00	0.00	0.00	0.00	0.00	2.93
		Overs	3.02	0.00	0.00	0.00	0.00	0.00	0.00	3.02
		Unders	2.86	0.00	0.00	0.00	0.00	0.00	0.00	2.86
-31.75R + 15.88	-1-1/4R + 5/8	Feed	9.15	1.34	0.00	0.00	0.00	0.89	0.00	11.38
		Overs	14.62	0.51	0.00	0.00	0.00	0.00	0.00	15.13
		Unders	4.21	2.09	0.00	0.00	0.00	1.70	0.00	8.00
-15.88 + 1.30	-5/8 + 0.051	Feed	30.94	1.23	0.20	0.00	12.23	3.26	0.00	47.86
		Overs	24.73	1.92	0.00	0.00	0.32	0.14	0.00	27.11
		Unders	36.54	0.60	0.38	0.00	22.98	6.07	0.00	66.57
-1.30	-0.051	Feed	0.00	0.00	0.00	0.00	0.00	0.00	14.91	14.91
		Overs	0.00	0.00	0.00	0.00	0.00	0.00	6.41	6.41
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	22.57	22.57
Total	-	Feed	65.02	3.49	0.20	0.00	12.23	4.15	14.91	100.00
		Overs	88.75	4.38	0.00	0.00	0.32	0.14	6.41	100.00
		Unders	43.61	2.69	0.38	0.00	22.98	7.77	22.57	100.00

* R designates round sieve opening.

TABLE B-5. COMPONENT/SIZE DISTRIBUTION (6 rpm, feedrate = 23.91 Mg/h (26.30 tons/h), October 1980)
(% by weight)

	Size class*		Material	Paper & plastic	Organic other	Nonferrous	Ferrous	Glass	Inorganic other	Fines (-1.30 mm)	Total
	mm	in.									
B-6	+76.20	+3	Feed	6.79	0.74	0.00	0.00	0.00	0.00	0.00	7.53
			Overs	8.93	0.97	0.00	0.00	0.00	0.00	0.00	9.90
			Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	-76.20 + 50.80	-3 + 2	Feed	5.04	0.00	0.00	0.00	0.00	0.00	0.00	5.04
			Overs	6.62	0.00	0.00	0.00	0.00	0.00	0.00	6.62
			Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	-50.80 + 25.40	-2 + 1	Feed	11.44	0.02	0.00	0.00	0.00	0.00	0.00	11.46
			Overs	15.04	0.03	0.00	0.00	0.00	0.00	0.00	15.07
			Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	-25.40 + 31.75R	-1 + 1-1/4R	Feed	1.88	0.00	0.00	0.00	0.00	0.00	0.00	1.88
			Overs	2.47	0.00	0.00	0.00	0.00	0.00	0.00	2.47
			Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	-31.75R + 15.88	-1-1/4R + 5/8	Feed	13.20	0.64	0.00	0.00	0.00	0.00	0.00	13.84
			Overs	16.14	0.84	0.00	0.00	0.00	0.00	0.00	16.98
			Unders	3.87	0.00	0.00	0.00	0.00	0.00	0.00	3.87
	-15.88 + 1.30	-5/8 + 0.051	Feed	41.28	3.97	0.21	0.21	3.19	0.22	0.00	49.08
			Overs	38.39	4.30	0.19	0.00	1.94	0.10	0.00	44.92
			Unders	50.46	2.94	0.29	0.89	7.13	0.61	0.00	62.32
	-1.30	-0.051	Feed	0.00	0.00	0.00	0.00	0.00	0.00	11.17	11.17
			Overs	0.00	0.00	0.00	0.00	0.00	0.00	4.04	4.04
			Unders	0.00	0.00	0.00	0.00	0.00	0.00	33.81	33.81
	Total	-	Feed	79.63	5.37	0.21	0.21	3.19	0.22	11.17	100.00
			Overs	87.59	6.14	0.19	0.00	1.94	0.10	4.04	100.00
			Unders	54.33	2.94	0.29	0.89	7.13	0.61	33.81	100.00

* R designates round sieve opening.

TABLE B-6. COMPONENT/SIZE DISTRIBUTION (9 rpm, feedrate = 2.82 Mg/h (3.10 tons/h), October 1980)
(% by weight)

	Size class*		Material	Paper & plastic	Organic other	Nonferrous	Ferrous	Glass	Inorganic other	Fines (-1.30 mm)	Total
	mm	in.									
+76.20	+3	Feed	7.85	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.85
		Overs	17.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	17.14
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-76.20 + 50.80	-3 + 2	Feed	10.46	0.46	0.00	0.00	0.00	0.00	0.00	0.00	10.92
		Overs	22.82	1.01	0.00	0.00	0.00	0.00	0.00	0.00	23.83
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-50.80 + 25.40	-2 + 1	Feed	12.57	0.00	0.00	0.00	0.00	0.00	0.00	0.00	12.57
		Overs	27.43	0.00	0.00	0.00	0.00	0.00	0.00	0.00	27.43
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-25.40 + 31.75R	-1 + 1-1/4R	Feed	1.97	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.97
		Overs	3.96	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.96
		Unders	0.29	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.29
-31.75R + 15.88	-1-1/4R + 5/8	Feed	11.56	0.30	0.00	0.00	0.00	0.00	0.00	0.00	11.86
		Overs	16.74	0.45	0.00	0.00	0.00	0.00	0.00	0.00	17.19
		Unders	7.18	0.17	0.00	0.00	0.00	0.00	0.00	0.00	7.35
-15.88 + 1.30	-5/8 + 0.051	Feed	29.07	3.91	0.11	0.07	3.87	0.55	0.00	0.00	37.58
		Overs	8.82	0.30	0.00	0.00	0.02	0.04	0.00	0.00	9.18
		Unders	46.20	6.96	0.20	0.12	7.13	0.98	0.00	0.00	61.59
-1.30	-0.051	Feed	0.00	0.00	0.00	0.00	0.00	0.00	0.00	17.25	17.25
		Overs	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.27	1.27
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.77	30.77
Total	-	Feed	73.48	4.67	0.11	0.07	3.87	0.55	0.00	17.25	100.00
		Overs	96.91	1.76	0.00	0.00	0.02	0.04	0.00	1.27	100.00
		Unders	53.67	7.13	0.20	0.12	7.13	0.98	0.00	30.77	100.00

* R designates round sieve opening.

TABLE B-7. COMPONENT/SIZE DISTRIBUTION (9 rpm, feedrate = 5.85 Mg/h (6.44 tons/h), October 1980)
(% by weight)

Size class*		Material	Paper & plastic	Organic other	Nonferrous	Ferrous	Glass	Inorganic other	Fines (-1.30 mm)	Total
mm	in.									
+76.20	+3	Feed	2.87	0.00	0.00	0.00	0.00	0.00	0.00	2.87
		Overs	7.53	0.00	0.00	0.00	0.00	0.00	0.00	7.53
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-76.20 + 50.80	-3 + 2	Feed	9.55	0.00	0.00	0.00	0.00	0.00	0.00	9.55
		Overs	25.08	0.00	0.00	0.00	0.00	0.00	0.00	25.08
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-50.80 + 25.40	-2 + 1	Feed	12.16	0.01	0.00	0.00	0.00	0.00	0.00	12.17
		Overs	31.91	0.04	0.00	0.00	0.00	0.00	0.00	31.95
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-25.40 + 31.75R	-1 + 1-1/4R	Feed	1.29	0.00	0.00	0.00	0.00	0.00	0.00	1.29
		Overs	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.50
		Unders	1.77	0.00	0.00	0.00	0.00	0.00	0.00	1.77
-31.75R + 15.88	-1-1/4R + 5/8	Feed	13.24	2.86	0.00	0.00	0.34	0.00	0.00	16.44
		Overs	23.60	1.53	0.00	0.00	0.00	0.00	0.00	25.13
		Unders	6.87	3.68	0.00	0.00	0.54	0.00	0.00	11.09
-15.88 + 1.30	-5/8 + 0.051	Feed	31.67	2.06	0.01	0.13	10.48	2.71	0.00	47.06
		Overs	7.37	0.55	0.00	0.00	0.04	0.00	0.00	7.96
		Unders	46.64	2.99	0.01	0.20	16.90	4.38	0.00	71.12
-1.30	-0.051	Feed	0.00	0.00	0.00	0.00	0.00	0.00	10.62	10.62
		Overs	0.00	0.00	0.00	0.00	0.00	0.00	1.85	1.85
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	16.02	16.02
Total	-	Feed	70.78	4.93	0.01	0.13	10.82	2.71	10.62	100.00
		Overs	95.99	2.12	0.00	0.00	0.04	0.00	1.85	100.00
		Unders	55.28	6.67	0.01	0.20	17.44	4.38	16.02	100.00

* R designates round sieve opening.

TABLE B-8. COMPONENT/SIZE DISTRIBUTION (9 rpm, feedrate = 10.55 Mg/h (11.60 tons/h), October 1980)
(% by weight)

Size class*		Material	Paper & plastic	Organic other	Nonferrous	Ferrous	Glass	Inorganic other	Fines (-1.30 mm)	Total
mm	in.									
+76.20	+3	Feed	14.61	0.00	0.00	0.00	0.00	0.00	0.00	14.61
		Overs	20.95	0.00	0.00	0.00	0.00	0.00	0.00	20.95
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-76.20 + 50.80	-3 + 2	Feed	13.19	0.00	0.00	0.00	0.00	0.00	0.00	13.19
		Overs	18.91	0.00	0.00	0.00	0.00	0.00	0.00	18.91
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-50.80 + 25.40	-2 + 1	Feed	14.08	0.93	0.00	0.00	0.00	0.00	0.00	15.01
		Overs	20.18	1.34	0.00	0.00	0.00	0.00	0.00	21.52
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-25.40 + 31.75R	-1 + 1-1/4R	Feed	2.54	0.02	0.00	0.00	0.00	0.00	0.00	2.56
		Overs	3.41	0.02	0.00	0.00	0.00	0.00	0.00	3.43
		Unders	0.54	0.00	0.00	0.00	0.00	0.00	0.00	0.54
-31.75R + 15.88	-1-1/4R + 5/8	Feed	9.82	0.11	0.00	0.00	0.00	0.00	0.00	9.93
		Overs	12.50	0.15	0.00	0.00	0.00	0.00	0.00	12.65
		Unders	3.65	0.00	0.00	0.00	0.00	0.00	0.00	3.65
-15.88 + 1.30	-5/8 + 0.051	Feed	23.78	4.00	0.04	0.00	3.39	0.77	0.00	31.98
		Overs	16.26	2.23	0.02	0.00	0.12	0.10	0.00	18.73
		Unders	41.15	8.08	0.07	0.00	10.91	2.30	0.00	62.51
-1.30	-0.051	Feed	0.00	0.00	0.00	0.00	0.00	0.00	12.72	12.72
		Overs	0.00	0.00	0.00	0.00	0.00	0.00	3.81	3.81
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	33.30	33.30
Total	-	Feed	78.02	5.06	0.04	0.00	3.39	0.77	12.72	100.00
		Overs	92.21	3.74	0.02	0.00	0.12	0.10	3.81	100.00
		Unders	45.34	8.08	0.07	0.00	10.91	2.30	33.30	100.00

* R designates round sieve opening.

TABLE B-9. COMPONENT/SIZE DISTRIBUTION (9 rpm, feedrate = 15.86 Mg/h (17.45 tons/h), October 1980)
(% by weight)

B-10

Size class*		Material	Paper & plastic	Organic other	Nonferrous	Ferrous	Glass	Inorganic other	Fines (-1.30 mm)	Total
mm	in.									
+76.20	+3	Feed	3.30	0.00	0.00	0.00	0.00	0.00	0.00	3.30
		Overs	12.52	0.00	0.00	0.00	0.00	0.00	0.00	12.52
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-76.20 + 50.80	-3 + 2	Feed	23.97	0.17	0.00	0.00	0.00	0.00	0.00	24.14
		Overs	17.44	0.00	0.00	0.00	0.00	0.00	0.00	17.44
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-50.80 + 25.40	-2 + 1	Feed	13.63	0.00	0.00	0.00	0.00	0.00	0.00	13.63
		Overs	25.41	0.00	0.00	0.00	0.00	0.00	0.00	25.41
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-25.40 + 31.75R	-1 + 1-1/4R	Feed	2.42	0.00	0.00	0.00	0.00	0.00	0.00	2.42
		Overs	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.12
		Unders	0.30	0.00	0.00	0.00	0.00	0.00	0.00	0.30
-31.75R + 15.88	-1-1/4R + 5/8	Feed	9.79	0.09	0.00	0.00	0.00	0.00	0.00	9.88
		Overs	16.86	0.40	0.00	0.00	0.00	0.00	0.00	17.26
		Unders	4.42	0.00	0.00	0.00	0.00	0.00	0.00	4.42
-15.88 + 1.30	-5/8 + 0.051	Feed	21.12	3.62	0.06	0.13	5.93	2.68	0.00	33.54
		Overs	17.89	2.46	0.02	0.00	0.81	0.04	0.00	21.22
		Unders	37.02	7.43	0.16	0.38	16.38	7.48	0.00	68.85
-1.30	-0.051	Feed	0.00	0.00	0.00	0.00	0.00	0.00	13.09	13.09
		Overs	0.00	0.00	0.00	0.00	0.00	0.00	6.03	6.03
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	26.43	26.43
Total	-	Feed	74.23	3.88	0.06	0.13	5.93	2.68	13.09	100.00
		Overs	90.24	2.86	0.02	0.00	0.81	0.04	6.03	100.00
		Unders	41.74	7.43	0.16	0.38	16.38	7.48	26.43	100.00

* R designates round sieve opening.

TABLE B-10. COMPONENT/SIZE DISTRIBUTION (9 rpm, feedrate = 22.55 Mg/h (24.80 tons/h), October 1980)
(% by weight)

B-11

Size class*		Material	Paper & plastic	Organic other	Nonferrous	Ferrous	Glass	Inorganic other	Fines (-1.30 mm)	Total
mm	in.									
+76.20	+3	Feed	8.01	0.00	0.00	0.00	0.00	0.00	0.00	8.01
		Overs	12.52	0.00	0.00	0.00	0.00	0.00	0.00	12.52
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-76.20 + 50.80	-3 + 2	Feed	11.15	0.00	0.00	0.00	0.00	0.00	0.00	11.15
		Overs	17.44	0.00	0.00	0.00	0.00	0.00	0.00	17.44
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-50.80 + 25.40	-2 + 1	Feed	16.25	0.00	0.00	0.00	0.00	0.00	0.00	16.25
		Overs	25.41	0.00	0.00	0.00	0.00	0.00	0.00	25.41
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-25.40 + 31.75R	-1 + 1-1/4R	Feed	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.08
		Overs	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.12
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-31.75R + 15.88	-1-1/4R + 5/8	Feed	11.74	0.25	0.00	0.00	0.00	0.00	0.00	11.99
		Overs	16.86	0.40	0.00	0.00	0.00	0.00	0.00	17.26
		Unders	2.66	0.00	0.00	0.00	0.00	0.00	0.00	2.66
-15.88 + 1.30	-5/8 + 0.051	Feed	26.15	2.58	0.03	0.00	9.94	0.35	0.00	39.05
		Overs	17.89	2.46	0.02	0.00	0.81	0.04	0.00	21.22
		Unders	40.81	2.79	0.06	0.00	26.13	0.88	0.00	70.67
-1.30	-0.051	Feed	0.00	0.00	0.00	0.00	0.00	0.00	13.47	13.47
		Overs	0.00	0.00	0.00	0.00	0.00	0.00	6.03	6.03
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	26.67	26.67
Total	-	Feed	73.38	2.83	0.03	0.00	9.94	0.35	13.47	100.00
		Overs	90.24	2.86	0.02	0.00	0.81	0.04	6.03	100.00
		Unders	43.47	2.79	0.06	0.00	26.13	0.88	26.67	100.00

* R designates round sieve opening.

TABLE B-11. COMPONENT/SIZE DISTRIBUTION (12 rpm, feedrate = 3.43 Mg/h (3.77 tons/h), October 1980)
(% by weight)

Size class*		Material	Paper & plastic	Organic other	Nonferrous	Ferrous	Glass	Inorganic other	Fines (-1.30 mm)	Total
mm	in.									
+76.20	+3	Feed	8.64	0.00	0.00	0.00	0.00	0.00	0.00	8.64
		Overs	24.31	0.00	0.00	0.00	0.00	0.00	0.00	24.31
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-76.20 + 50.80	-3 + 2	Feed	11.73	0.00	0.00	0.00	0.00	0.00	0.00	11.73
		Overs	33.01	0.00	0.00	0.00	0.00	0.00	0.00	33.01
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-50.80 + 25.40	-2 + 1	Feed	9.46	0.13	0.00	0.00	0.00	0.00	0.00	9.59
		Overs	26.63	0.37	0.00	0.00	0.00	0.00	0.00	27.00
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-25.40 + 31.75R	-1 + 1-1/4R	Feed	0.44	0.00	0.00	0.00	4.67	0.00	0.00	5.11
		Overs	1.04	0.00	0.00	0.00	0.00	0.00	0.00	1.04
		Unders	0.11	0.00	0.00	0.00	7.24	0.00	0.00	7.35
-31.75R + 15.88	-1-1/4R + 5/8	Feed	5.50	0.26	0.00	0.00	1.06	5.02	0.00	11.84
		Overs	8.74	0.53	0.00	0.00	0.00	0.00	0.00	9.27
		Unders	3.72	0.11	0.00	0.00	1.64	7.79	0.00	13.26
-15.88 + 1.30	-5/8 + 0.051	Feed	17.73	2.88	0.03	0.00	12.01	2.78	0.00	35.43
		Overs	3.80	0.47	0.00	0.00	0.01	0.05	0.00	4.33
		Unders	25.41	4.21	0.04	0.00	18.62	4.29	0.00	52.57
-1.30	-0.051	Feed	0.00	0.00	0.00	0.00	0.00	0.00	17.66	17.66
		Overs	0.00	0.00	0.00	0.00	0.00	0.00	1.04	1.04
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	26.82	26.82
Total	-	Feed	53.50	3.27	0.03	0.00	17.74	7.80	17.66	100.00
		Overs	97.53	1.37	0.00	0.00	0.01	0.05	1.04	100.00
		Unders	29.24	4.32	0.04	0.00	27.50	12.08	26.82	100.00

* R designates round sieve opening.

TABLE E-12. COMPONENT/SIZE DISTRIBUTION (12 rpm, feedrate = 9.11 Mg/h (10.02 tons/h), October 1980)
(% by weight)

Size class*		Material	Paper & plastic	Organic other	Nonferrous	Ferrous	Glass	Inorganic other	Fines (-1.30 mm)	Total
mm	in.									
+76.20	+3	Feed	9.21	0.00	0.00	0.00	0.00	0.00	0.00	9.21
		Overs	14.47	0.00	0.00	0.00	0.00	0.00	0.00	14.47
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-76.20 + 50.80	-3 + 2	Feed	14.01	0.00	0.00	0.00	0.00	0.00	0.00	14.01
		Overs	22.01	0.00	0.00	0.00	0.00	0.00	0.00	22.01
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-50.80 + 25.40	-2 + 1	Feed	21.66	0.00	0.00	0.00	0.00	0.00	0.00	21.66
		Overs	34.02	0.00	0.00	0.00	0.00	0.00	0.00	34.02
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-25.40 + 31.75R	-1 + 1-1/4R	Feed	1.64	0.17	0.00	0.00	0.70	0.00	0.00	2.51
		Overs	2.39	0.27	0.00	0.00	0.00	0.00	0.00	2.66
		Unders	0.33	0.00	0.00	0.00	1.92	0.00	0.00	2.25
-31.75R + 15.88	-1-1/4R + 5/8	Feed	10.07	0.36	0.00	0.00	0.53	1.14	0.00	12.10
		Overs	12.35	0.56	0.00	0.00	0.08	0.09	0.00	13.08
		Unders	6.05	0.02	0.00	0.00	1.32	2.98	0.00	10.37
-15.88 + 1.30	-5/8 + 0.051	Feed	21.90	1.55	0.03	0.00	3.69	0.21	0.00	27.38
		Overs	11.60	0.33	0.00	0.00	0.00	0.00	0.00	11.93
		Unders	39.96	3.68	0.07	0.00	10.16	0.59	0.00	54.46
-1.30	-0.051	Feed	0.00	0.00	0.00	0.00	0.00	0.00	13.13	13.13
		Overs	0.00	0.00	0.00	0.00	0.00	0.00	1.83	1.83
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	32.92	32.92
Total	-	Feed	78.49	2.08	0.03	0.00	4.92	1.35	13.13	100.00
		Overs	96.84	1.16	0.00	0.00	0.08	0.09	1.83	100.00
		Unders	46.34	3.70	0.07	0.00	13.40	3.57	32.92	100.00

* R designates round sieve opening.

TABLE B-13. COMPONENT/SIZE DISTRIBUTION (12 rpm, feedrate = 13.62 Mg/h (14.98 tons/h), October 1980)
(% by weight)

Size class*		Material	Paper & plastic	Organic other	Nonferrous	Ferrous	Glass	Inorganic other	Fines (-1.30 mm)	Total
mm	in.									
+76.20	+3	Feed	2.13	0.00	0.00	0.00	0.00	0.00	0.00	2.13
		Overs	4.79	0.00	0.00	0.00	0.00	0.00	0.00	4.79
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-76.20 + 50.80	-3 + 2	Feed	7.17	0.00	0.00	0.00	0.00	0.00	0.00	7.17
		Overs	16.11	0.00	0.00	0.00	0.00	0.00	0.00	16.11
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-50.80 + 25.40	-2 + 1	Feed	14.99	0.00	0.00	0.00	0.00	0.00	0.00	14.99
		Overs	33.59	0.00	0.00	0.00	0.00	0.00	0.00	33.69
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-25.40 + 31.75R	-1 + 1-1/4R	Feed	3.41	0.20	0.00	0.00	0.00	0.00	0.00	3.61
		Overs	4.51	0.45	0.00	0.00	0.00	0.00	0.00	4.96
		Unders	2.53	0.00	0.00	0.00	0.00	0.00	0.00	2.53
-31.75R + 15.88	-1-1/4R + 5/8	Feed	9.35	0.55	0.00	0.00	0.00	0.00	0.00	10.40
		Overs	16.79	1.14	0.00	0.00	0.00	0.00	0.00	17.93
		Unders	4.28	0.08	0.00	0.00	0.00	0.00	0.00	4.36
-15.88 + 1.30	-5/8 + 0.051	Feed	34.76	3.20	0.07	0.67	3.67	0.85	0.00	43.22
		Overs	17.65	2.07	0.00	0.00	0.06	0.07	0.00	19.85
		Unders	48.49	4.11	0.13	1.20	6.56	1.47	0.00	61.96
-1.30	-0.051	Feed	0.00	0.00	0.00	0.00	0.00	0.00	18.48	18.48
		Overs	0.00	0.00	0.00	0.00	0.00	0.00	2.67	2.67
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	31.15	31.15
Total	-	Feed	72.31	3.95	0.07	0.67	3.67	0.85	18.48	100.00
		Overs	93.54	3.66	0.00	0.00	0.06	0.07	2.67	100.00
		Unders	55.30	4.19	0.13	1.20	6.56	1.47	31.15	100.00

* R designates round sieve opening.

TABLE B-14. COMPONENT/SIZE DISTRIBUTION (12 rpm, feedrate = 30.27 Mg/h (33.30 tons/h), October 1980)
(% by weight)

B-15

Size class*		Material	Paper & plastic	Organic other	Nonferrous	Ferrous	Glass	Inorganic other	Fines (-1.30 mm)	Total
mm	in.									
+76.20	+3	Feed	8.48	0.00	0.00	0.00	0.00	0.00	0.00	8.48
		Overs	12.38	0.00	0.00	0.00	0.00	0.00	0.00	12.38
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-76.20 + 50.80	-3 + 2	Feed	11.41	0.00	0.00	0.00	0.00	0.00	0.00	11.41
		Overs	16.66	0.00	0.00	0.00	0.00	0.00	0.00	16.66
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-50.80 + 25.40	-2 + 1	Feed	15.51	0.00	0.00	0.00	0.00	0.00	0.00	15.51
		Overs	22.64	0.00	0.00	0.00	0.00	0.00	0.00	22.64
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-25.40 + 31.75R	-1 + 1-1/4R	Feed	1.84	0.00	0.00	0.00	0.00	0.00	0.00	1.84
		Overs	2.69	0.00	0.00	0.00	0.00	0.00	0.00	2.69
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-31.75R + 15.88	-1-1/4R + 5/8	Feed	12.12	0.65	0.00	0.00	0.00	0.00	0.00	12.77
		Overs	16.33	0.27	0.00	0.00	0.00	0.00	0.00	16.60
		Unders	2.95	1.48	0.00	0.00	0.00	0.00	0.00	4.43
-15.88 + 1.30	-5/8 + 0.051	Feed	24.34	2.55	0.21	0.26	3.78	0.32	0.00	31.46
		Overs	17.82	2.62	0.09	0.38	0.34	0.07	0.00	21.32
		Unders	38.54	2.37	0.46	0.00	11.27	0.87	0.00	53.51
-1.30	-0.051	Feed	0.00	0.00	0.00	0.00	0.00	0.00	18.53	18.53
		Overs	0.00	0.00	0.00	0.00	0.00	0.00	7.71	7.71
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	42.06	42.06
Total	-	Feed	73.70	3.20	0.21	0.26	3.78	0.32	18.53	100.00
		Overs	88.52	2.89	0.09	0.38	0.34	0.07	7.71	100.00
		Unders	41.49	3.85	0.46	0.00	11.27	0.87	42.06	100.00

* R designates round sieve opening.

TABLE B-15. COMPONENT/SIZE DISTRIBUTION (12 rpm, feedrate = 38.52 Mg/h (42.37 tons/h), October 1980)
(% by weight)

	Size class*		Material	Paper & plastic	Organic other	Nonferrous	Ferrous	Glass	Inorganic other	Fines (-1.30 mm)	Total
	mm	in.									
B-16	+76.20	+3	Feed	3.29	0.00	0.00	0.00	0.00	0.00	0.00	3.29
			Overs	4.78	0.00	0.00	0.00	0.00	0.00	0.00	4.78
			Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	-76.20 + 50.80	-3 + 2	Feed	8.55	0.00	0.00	0.00	0.00	0.00	0.00	8.55
			Overs	12.44	0.00	0.00	0.00	0.00	0.00	0.00	12.44
			Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	-50.80 + 25.40	-2 + 1	Feed	12.10	2.05	0.00	0.00	0.00	0.00	0.00	14.15
			Overs	17.60	2.98	0.00	0.00	0.00	0.00	0.00	20.58
			Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	-25.40 + 31.75R	-1 + 1-1/4R	Feed	2.61	0.22	0.24	0.00	0.00	0.00	0.00	3.07
			Overs	3.04	0.33	0.35	0.00	0.00	0.00	0.00	3.72
			Unders	1.67	0.00	0.00	0.00	0.00	0.00	0.00	1.67
	-31.75R + 15.88	-1-1/4R + 5/8	Feed	12.31	0.01	0.00	0.00	0.00	0.00	0.00	12.32
			Overs	16.45	0.00	0.00	0.00	0.00	0.00	0.00	16.46
			Unders	3.13	0.02	0.00	0.00	0.00	0.00	0.00	3.20
	-15.88 + 1.30	-5/8 + 0.051	Feed	32.85	4.18	0.36	0.00	3.40	0.37	0.00	41.16
			Overs	29.41	4.08	0.48	0.00	0.59	0.10	0.00	34.66
			Unders	40.43	4.40	0.10	0.00	9.59	0.96	0.00	55.48
	-1.30	-0.051	Feed	0.00	0.00	0.00	0.00	0.00	0.00	17.46	17.46
			Overs	0.00	0.00	0.00	0.00	0.00	0.00	7.36	7.36
			Unders	0.00	0.00	0.00	0.00	0.00	0.00	39.65	39.65
	Total	-	Feed	71.71	6.46	0.60	0.00	3.40	0.37	17.46	100.00
			Overs	83.73	7.39	0.83	0.00	0.59	0.10	7.36	100.00
			Unders	45.28	4.42	0.10	0.00	9.59	0.96	39.65	100.00

* R designates round sieve opening.

TABLE B-16. COMPONENT/SIZE DISTRIBUTION (6 rpm, feedrate = 0.96 Mg/h (1.06 tons/h), January 1981)
(% by weight)

Size class*		Material	Paper & plastic	Organic other	Nonferrous	Ferrous	Glass	Inorganic other	Fines (-1.30 mm)	Total
mm	in.									
+76.20	+3	Feed	2.57	0.00	0.00	0.00	0.00	0.00	0.00	2.57
		Overs	7.10	0.00	0.00	0.00	0.00	0.00	0.00	7.10
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-76.20 + 50.80	-3 + 2	Feed	12.09	0.00	0.00	0.00	0.00	0.00	0.00	12.09
		Overs	33.36	0.00	0.00	0.00	0.00	0.00	0.00	33.36
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-50.80 + 25.40	-2 + 1	Feed	13.13	0.03	0.00	0.00	0.00	0.00	0.00	13.16
		Overs	36.22	0.07	0.00	0.00	0.00	0.00	0.00	36.29
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-25.40 + 31.75R	-1 + 1-1/4R	Feed	0.89	0.00	0.00	0.00	0.00	0.00	0.00	0.89
		Overs	2.46	0.00	0.00	0.00	0.00	0.00	0.00	2.46
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-31.75R + 15.88	-1-1/4R + 5/8	Feed	10.08	0.20	0.00	0.00	0.00	0.00	0.00	10.28
		Overs	15.42	0.56	0.00	0.00	0.00	0.00	0.00	15.98
		Unders	7.05	0.00	0.00	0.00	0.00	0.00	0.00	7.05
-15.83 + 1.30	-5/8 + 0.051	Feed	40.29	3.85	0.04	0.00	1.95	0.00	0.00	46.13
		Overs	4.30	0.00	0.00	0.00	0.00	0.00	0.00	4.30
		Unders	60.75	6.03	0.07	0.00	3.06	0.00	0.00	69.91
-1.30	-0.051	Feed	0.00	0.00	0.00	0.00	0.00	0.00	14.88	14.88
		Overs	0.00	0.00	0.00	0.00	0.00	0.00	0.51	0.51
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	23.04	23.04
Total	-	Feed	79.05	4.08	0.04	0.00	1.95	0.00	14.88	100.00
		Overs	98.86	0.63	0.00	0.00	0.00	0.00	0.51	100.00
		Unders	67.80	6.03	0.07	0.00	3.06	0.00	23.04	100.00

* R designates round sieve opening.

TABLE B-17. COMPONENT/SIZE DISTRIBUTION (6 rpm, feedrate = 2.97 Mg/h (3.27 tons/h), January 1981)
(% by weight)

	Size class*		Material	Paper & plastic	Organic other	Nonferrous	Ferrous	Glass	Inorganic other	Fines (-1.30 mm)	Total
	mm	in.									
B-18	+76.20	+3	Feed	15.51	0.00	0.00	0.00	0.00	0.00	0.00	15.51
			Overs	29.65	0.00	0.00	0.00	0.00	0.00	0.00	29.65
			Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	-76.20 + 50.80	-3 + 2	Feed	16.51	0.07	0.00	0.00	0.00	0.00	0.00	16.58
			Overs	31.56	0.14	0.00	0.00	0.00	0.00	0.00	31.70
			Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	-50.80 + 25.40	-2 + 1	Feed	7.80	0.00	0.00	0.00	0.00	0.00	0.00	7.80
			Overs	14.92	0.00	0.00	0.00	0.00	0.00	0.00	14.92
			Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	-25.40 + 31.75R	-1 + 1-1/4R	Feed	1.49	0.00	0.00	0.00	0.00	0.00	0.00	1.49
			Overs	2.84	0.00	0.00	0.00	0.00	0.00	0.00	2.84
			Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	-31.75R + 15.88	-1-1/4R + 5/8	Feed	7.03	0.02	0.00	0.00	0.00	0.00	0.00	7.05
			Overs	11.05	0.03	0.00	0.00	0.00	0.00	0.00	11.08
			Unders	2.63	0.00	0.00	0.00	0.00	0.00	0.00	2.63
	-15.88 + 1.30	-5/8 + 0.051	Feed	27.86	1.52	0.46	0.03	7.54	0.61	0.00	38.02
			Overs	8.36	0.18	0.43	0.05	0.00	0.09	0.00	9.11
			Unders	49.28	3.00	0.49	0.00	15.81	1.16	0.00	69.74
	-1.30	-0.051	Feed	0.00	0.00	0.00	0.00	0.00	0.00	13.55	13.55
			Overs	0.00	0.00	0.00	0.00	0.00	0.00	0.70	0.70
			Unders	0.00	0.00	0.00	0.00	0.00	0.00	27.63	27.63
	Total	-	Feed	76.20	1.61	0.46	0.03	7.54	0.61	13.55	100.00
			Overs	98.33	0.35	0.43	0.05	0.00	0.09	0.70	100.00
			Unders	51.91	3.00	0.49	0.00	15.81	1.16	27.63	100.00

* R designates round sieve opening.

TABLE B-18. COMPONENT/SIZE DISTRIBUTION (6 rpm, feedrate = 5.58 Mg/h (6.14 tons/h), January 1981)
(% by weight)

	Size class*		Material	Paper & plastic	Organic other	Nonferrous	Ferrous	Glass	Inorganic other	Fines (-1.30 mm)	Total
	mm	in.									
B-19	+76.20	+3	Feed	6.00	0.24	0.00	0.00	0.00	0.00	0.00	6.24
			Overs	8.60	0.34	0.00	0.00	0.00	0.00	0.00	8.94
			Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	-76.20 + 50.80	-3 + 2	Feed	22.46	1.56	0.00	0.00	0.00	0.00	0.00	24.02
			Overs	32.16	2.24	0.00	0.00	0.00	0.00	0.00	34.40
			Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	-50.80 + 25.40	-2 + 1	Feed	11.98	0.63	0.00	0.00	0.00	0.00	0.00	12.61
			Overs	17.16	0.90	0.00	0.00	0.00	0.00	0.00	18.06
			Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	-25.40 + 31.75R	-1 + 1-1/4R	Feed	1.68	0.14	0.00	0.00	0.00	0.00	0.00	1.82
			Overs	2.41	0.20	0.00	0.00	0.00	0.00	0.00	2.61
			Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	-31.75R + 15.88	-1-1/4R + 5/8	Feed	9.72	0.68	1.01	0.00	0.00	0.00	0.00	11.41
			Overs	12.76	0.38	1.45	0.00	0.00	0.00	0.00	14.59
			Unders	2.69	1.39	0.00	0.00	0.00	0.00	0.00	4.08
	-15.88 + 1.30	-5/8 + 0.051	Feed	21.96	6.38	0.03	0.00	4.53	0.48	0.00	33.37
			Overs	14.51	4.05	0.03	0.00	0.47	0.10	0.00	19.16
			Unders	39.21	11.74	0.02	0.00	13.95	1.34	0.00	66.26
	-1.30	-0.051	Feed	0.00	0.00	0.00	0.00	0.00	0.00	10.52	10.52
			Overs	0.00	0.00	0.00	0.00	0.00	0.00	2.24	2.24
			Unders	0.00	0.00	0.00	0.00	0.00	0.00	29.66	29.66
	Total	-	Feed	73.80	9.63	1.04	0.00	4.53	0.48	10.52	100.00
			Overs	87.60	8.11	1.48	0.00	0.47	0.10	2.24	100.00
			Unders	41.90	13.13	0.02	0.00	13.95	1.34	29.66	100.00

* R designates round sieve opening.

TABLE B-19. COMPONENT/SIZE DISTRIBUTION (6 rpm, feedrate = 9.62 Mg/h (10.58 tons/h), January 1981)
(% by weight)

	Size class*		Material	Paper & plastic	Organic other	Nonferrous	Ferrous	Glass	Inorganic other	Fines (-1.30 mm)	Total
	mm	in.									
B-20	+76.20	+3	Feed	7.81	0.94	0.00	0.00	0.00	0.00	0.00	8.75
			Overs	10.17	1.22	0.00	0.00	0.00	0.00	0.00	11.39
			Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	-76.20 + 50.80	-3 + 2	Feed	27.81	0.07	0.00	0.00	0.00	0.00	0.00	27.88
			Overs	36.23	0.09	0.00	0.00	0.00	0.00	0.00	36.32
			Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	-50.80 + 25.40	-2 + 1	Feed	10.86	0.00	0.00	0.00	0.00	0.00	0.00	10.86
			Overs	14.15	0.00	0.00	0.00	0.00	0.00	0.00	14.15
			Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	-25.40 + 31.75R	-1 + 1-1/4R	Feed	2.01	0.02	0.00	0.00	0.00	0.00	0.00	2.03
			Overs	2.62	0.02	0.00	0.00	0.00	0.00	0.00	2.64
			Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	-31.75R + 15.88	-1-1/4R + 5/8	Feed	9.43	0.05	0.00	0.00	0.00	0.00	0.00	9.48
			Overs	11.64	0.07	0.00	0.00	0.00	0.00	0.00	11.71
			Unders	2.12	0.00	0.00	0.00	0.00	0.00	0.00	2.12
	-15.88 + 1.30	-5/8 + 0.051	Feed	18.23	3.85	0.00	0.00	6.21	0.73	0.00	29.02
			Overs	14.60	1.77	0.00	0.00	1.89	0.95	0.00	19.21
			Unders	30.27	10.67	0.00	0.00	20.48	0.00	0.00	61.42
	-1.30	-0.051	Feed	0.00	0.00	0.00	0.00	0.00	0.00	11.98	11.98
			Overs	0.00	0.00	0.00	0.00	0.00	0.00	4.58	4.58
			Unders	0.00	0.00	0.00	0.00	0.00	0.00	36.46	36.46
	Total	-	Feed	76.15	4.93	0.00	0.00	6.21	0.73	11.98	100.00
			Overs	89.41	3.17	0.00	0.00	1.89	0.95	4.58	100.00
			Unders	32.39	10.67	0.00	0.00	20.48	0.00	36.46	100.00

* R designates round sieve opening.

TABLE B-20. COMPONENT/SIZE DISTRIBUTION (6 rpm, feedrate = 12.57 Mg/h (13.83 tons/h), January 1981)
(% by weight)

B-21

Size class*		Material	Paper & plastic	Organic other	Nonferrous	Ferrous	Glass	Inorganic other	Fines (-1.30 mm)	Total
mm	in.									
+76.20	+3	Feed	8.38	0.00	0.00	0.00	0.00	0.00	0.00	8.38
		Overs	11.52	0.00	0.00	0.00	0.00	0.00	0.00	11.52
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-76.20 + 50.80	-3 + 2	Feed	20.59	0.39	0.00	0.00	0.00	0.00	0.00	20.98
		Overs	28.31	0.54	0.00	0.00	0.00	0.00	0.00	28.85
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-50.80 + 25.40	-2 + 1	Feed	13.33	0.20	0.00	0.00	0.00	0.00	0.00	13.53
		Overs	18.35	0.28	0.00	0.00	0.00	0.00	0.00	18.63
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-25.40 + 31.75R	-1 + 1-1/4R	Feed	1.19	0.29	0.00	0.00	0.00	0.00	0.00	1.48
		Overs	1.61	0.40	0.00	0.00	0.00	0.00	0.00	2.01
		Unders	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.07
-31.75R + 15.88	-1-1/4R + 5/8	Feed	8.84	0.98	0.00	0.00	0.00	0.00	0.00	9.82
		Overs	11.32	1.29	0.00	0.00	0.00	0.00	0.00	12.61
		Unders	2.22	0.16	0.00	0.00	0.00	0.00	0.00	2.38
-15.88 + 1.30	-5/8 + 0.051	Feed	16.59	4.98	0.03	0.00	4.17	1.64	0.00	27.41
		Overs	12.92	3.43	0.00	0.00	1.28	0.73	0.00	18.36
		Unders	26.30	9.14	0.11	0.00	11.89	4.07	0.00	51.51
-1.30	-0.051	Feed	0.00	0.00	0.00	0.00	0.00	0.00	18.40	18.40
		Overs	0.00	0.00	0.00	0.00	0.00	0.00	8.02	8.02
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	46.04	46.04
Total	-	Feed	68.92	6.84	0.03	0.00	4.17	1.64	18.40	100.00
		Overs	84.03	5.94	0.00	0.00	1.28	0.73	8.02	100.00
		Unders	28.59	9.30	0.11	0.00	11.89	4.07	46.04	100.00

* R designates round sieve opening.

TABLE B-21. COMPONENT/SIZE DISTRIBUTION (9 rpm, feedrate = 1.97 Mg/h (2.17 tons/h), January 1981)
(% by weight)

Size class*		Material	Paper & plastic	Organic other	Nonferrous	Ferrous	Glass	Inorganic other	Fines (-1.30 mm)	Total
mm	in.									
+76.20	+3	Feed	8.09	0.00	0.00	0.00	0.00	0.00	0.00	8.09
		Overs	12.82	0.00	0.00	0.00	0.00	0.00	0.00	12.82
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-76.20 + 50.80	-3 + 2	Feed	15.56	0.00	0.00	0.00	0.00	0.00	0.00	15.56
		Overs	24.67	0.00	0.00	0.00	0.00	0.00	0.00	24.67
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-50.80 + 25.40	-2 + 1	Feed	22.02	0.00	0.00	0.00	0.00	0.00	0.00	22.02
		Overs	34.93	0.00	0.00	0.00	0.00	0.00	0.00	34.93
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-25.40 + 31.75R	-1 + 1-1/4R	Feed	2.45	0.00	0.00	0.00	0.00	0.00	0.00	2.45
		Overs	3.46	0.00	0.00	0.00	0.00	0.00	0.00	3.46
		Unders	0.73	0.00	0.00	0.00	0.00	0.00	0.00	0.73
-31.75R + 15.88	-1-1/4R + 5/8	Feed	13.18	0.03	0.23	0.00	0.00	0.00	0.00	13.44
		Overs	13.83	0.02	0.00	0.00	0.00	0.00	0.00	13.85
		Unders	12.08	0.04	0.61	0.00	0.00	0.00	0.00	12.73
-15.88 + 1.30	-5/8 + 0.051	Feed	30.07	2.18	0.06	0.00	0.68	0.26	0.00	33.25
		Overs	9.93	0.01	0.03	0.00	0.00	0.00	0.00	9.97
		Unders	64.44	5.90	0.12	0.00	1.84	0.71	0.00	73.01
-1.30	-0.051	Feed	0.00	0.00	0.00	0.00	0.00	0.00	5.19	5.19
		Overs	0.00	0.00	0.00	0.00	0.00	0.00	0.30	0.30
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	13.53	13.53
Total	-	Feed	91.37	2.21	0.29	0.00	0.68	0.26	5.19	100.00
		Overs	99.64	0.03	0.03	0.00	0.00	0.00	0.30	100.00
		Unders	77.25	5.94	0.73	0.00	1.84	0.71	13.53	100.00

* R designates round sieve opening.

TABLE B-22. COMPONENT/SIZE DISTRIBUTION (9 rpm, feedrate = 2.55 Mg/h (2.80 tons/h), January 1981)
(% by weight)

	Size class*		Material	Paper & plastic	Organic other	Nonferrous	Ferrous	Glass	Inorganic other	Fines (-1.30 mm)	Total
	mm	in.									
B-23	+76.20	+3	Feed	28.67	0.00	0.00	0.00	0.00	0.00	0.00	28.67
			Overs	38.92	0.00	0.00	0.00	0.00	0.00	0.00	38.92
			Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	-76.20 + 50.80	-3 + 2	Feed	18.25	0.00	0.00	0.00	0.00	0.00	0.00	18.25
			Overs	24.78	0.00	0.00	0.00	0.00	0.00	0.00	24.78
			Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	-50.80 + 25.40	-2 + 1	Feed	16.40	0.17	0.58	0.00	0.00	0.00	0.00	17.15
			Overs	22.27	0.23	0.79	0.00	0.00	0.00	0.00	23.29
			Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	-25.40 + 31.75R	-1 + 1-1/4R	Feed	0.84	0.00	0.00	0.00	0.00	0.00	0.00	0.84
			Overs	1.14	0.00	0.00	0.00	0.00	0.00	0.00	1.14
			Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	-31.75R + 15.88	-1-1/4R + 5/8	Feed	4.35	0.67	0.00	0.00	0.00	0.00	0.00	5.02
			Overs	4.46	0.69	0.00	0.00	0.00	0.00	0.00	5.15
			Unders	4.04	0.63	0.00	0.00	0.00	0.00	0.00	4.67
	-15.88 + 1.30	-5/8 + 0.051	Feed	9.63	4.95	0.02	0.01	5.93	0.60	0.00	21.14
			Overs	3.89	1.38	0.00	0.00	0.13	0.00	0.00	5.40
			Unders	25.70	14.88	0.06	0.03	22.16	2.26	0.00	65.09
	-1.30	-0.051	Feed	0.00	0.00	0.00	0.00	0.00	0.00	8.93	8.93
			Overs	0.00	0.00	0.00	0.00	0.00	0.00	1.32	1.32
			Unders	0.00	0.00	0.00	0.00	0.00	0.00	30.24	30.24
	Total	-	Feed	78.14	5.79	0.60	0.01	5.93	0.60	8.93	100.00
			Overs	95.46	2.30	0.79	0.00	0.13	0.00	1.32	100.00
			Unders	29.74	15.51	0.06	0.03	22.16	2.26	30.24	100.00

* R designates round sieve opening.

TABLE B-23. COMPONENT/SIZE DISTRIBUTION (9 rpm, feedrate = 7.23 Mg/h (7.95 tons/h), January 1981)
(% by weight)

Size class*		Material	Paper & plastic	Organic other	Nonferrous	Ferrous	Glass	Inorganic other	Fines (-1.30 mm)	Total
mm	in.									
+76.20	+3	Feed	12.74	0.00	0.00	0.03	0.00	0.00	0.00	12.74
		Overs	26.09	0.00	0.00	0.03	0.00	0.00	0.00	26.09
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-76.20 + 50.80	-3 + 2	Feed	16.72	0.13	0.00	0.00	0.00	0.00	0.00	16.85
		Overs	34.25	0.26	0.00	0.00	0.00	0.00	0.00	34.51
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-50.80 + 25.40	-2 + 1	Feed	7.25	0.00	0.50	0.00	0.00	0.00	0.00	7.75
		Overs	14.86	0.00	1.02	0.00	0.00	0.00	0.00	15.88
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-25.40 + 31.75R	-1 + 1-1/4R	Feed	1.91	0.00	0.00	0.00	0.00	0.00	0.00	1.91
		Overs	3.91	0.00	0.00	0.00	0.00	0.00	0.00	3.91
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-31.75R + 15.88	-1-1/4R + 5/8	Feed	6.59	0.05	0.34	0.00	0.00	0.00	0.00	6.98
		Overs	9.97	0.00	0.69	0.00	0.00	0.00	0.00	10.66
		Unders	3.37	0.09	0.00	0.00	0.00	0.00	0.00	3.46
-15.88 + 1.30	-5/8 + 0.051	Feed	24.73	4.84	0.02	0.03	6.07	0.67	0.00	36.36
		Overs	7.73	0.27	0.00	0.06	0.03	0.00	0.00	8.09
		Unders	40.96	9.21	0.04	0.00	11.84	1.31	0.00	63.36
-1.30	-0.051	Feed	0.00	0.00	0.00	0.00	0.00	0.00	17.41	17.41
		Overs	0.00	0.00	0.00	0.00	0.00	0.00	0.86	0.86
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	33.18	33.18
Total	-	Feed	69.94	5.02	0.86	0.03	6.07	0.67	17.41	100.00
		Overs	96.81	0.53	1.71	0.06	0.03	0.00	0.86	100.00
		Unders	44.33	9.30	0.04	0.00	11.84	1.31	33.18	100.00

* R designates round sieve opening.

TABLE B-24. COMPONENT/SIZE DISTRIBUTION (9 rpm, feedrate = 10.49 Mg/h (11.54 tons/h), January 1981)
(% by weight)

B-25

Size class*		Material	Paper & plastic	Organic other	Nonferrous	Ferrous	Glass	Inorganic other	Fines (-1.30 mm)	Total
mm	in.									
+76.20	+3	Feed	20.01	0.00	0.00	0.00	0.00	0.00	0.00	20.01
		Overs	26.80	0.00	0.00	0.00	0.00	0.00	0.00	26.80
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-76.20 + 50.80	-3 + 2	Feed	21.02	0.00	0.00	0.00	0.00	0.00	0.00	21.02
		Overs	28.14	0.00	0.00	0.00	0.00	0.00	0.00	28.14
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-50.80 + 25.40	-2 + 1	Feed	18.36	0.00	0.00	0.00	0.00	0.00	0.00	18.36
		Overs	24.59	0.00	0.00	0.00	0.00	0.00	0.00	24.59
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-25.40 + 31.75R	-1 + 1-1/4R	Feed	1.00	0.04	0.00	0.00	0.00	0.00	0.00	1.04
		Overs	1.18	0.05	0.00	0.00	0.00	0.00	0.00	1.23
		Unders	0.46	0.00	0.00	0.00	0.00	0.00	0.00	0.46
-31.75R + 15.88	-1-1/4R + 5/8	Feed	7.70	0.01	0.20	0.00	0.00	0.00	0.00	7.91
		Overs	8.33	0.00	0.00	0.00	0.00	0.00	0.00	8.33
		Unders	5.83	0.05	0.77	0.00	0.00	0.00	0.00	6.65
-15.88 + 1.30	-5/8 + 0.051	Feed	13.19	3.45	0.13	0.00	5.63	0.78	0.00	23.18
		Overs	7.15	0.64	0.01	0.00	0.40	0.18	0.00	8.38
		Unders	31.08	11.73	0.46	0.00	21.02	2.57	0.00	66.86
-1.30	-0.051	Feed	0.00	0.00	0.00	0.00	0.00	0.00	8.48	8.48
		Overs	0.00	0.00	0.00	0.00	0.00	0.00	2.53	2.53
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	26.03	26.03
Total	-	Feed	81.28	3.50	0.33	0.00	5.63	0.78	8.48	100.00
		Overs	96.19	0.69	0.01	0.00	0.40	0.18	2.53	100.00
		Unders	37.37	11.78	1.23	0.00	21.02	2.57	26.03	100.00

* R designates round sieve opening.

TABLE B-25. COMPONENT/SIZE DISTRIBUTION (9 rpm, feedrate 17.01 Mg/h (18.71 tons/h), January 1981)
(% by weight)

Size class*		Material	Paper & plastic	Organic other	Nonferrous	Ferrous	Glass	Inorganic other	Fines (-1.30 mm)	Total
mm	in.									
+76.20	+3	Feed	16.33	0.00	0.00	0.00	0.00	0.00	0.00	16.33
		Overs	25.69	0.00	0.00	0.00	0.00	0.00	0.00	25.69
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-76.20 + 50.80	-3 + 2	Feed	3.97	0.00	0.00	0.00	0.00	0.00	0.00	3.97
		Overs	6.24	0.00	0.00	0.00	0.00	0.00	0.00	6.24
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-50.80 + 25.40	-2 + 1	Feed	15.23	0.83	0.00	0.00	0.00	0.00	0.00	16.06
		Overs	23.97	1.31	0.00	0.00	0.00	0.00	0.00	25.28
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-25.40 + 31.75R	-1 + 1-1/4R	Feed	0.77	0.00	0.00	0.00	0.00	0.00	0.00	0.77
		Overs	1.01	0.00	0.00	0.00	0.00	0.00	0.00	1.01
		Unders	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36
-31.75R + 15.88	-1-1/4R + 5/8	Feed	8.55	0.00	0.00	0.00	0.00	0.00	0.00	8.55
		Overs	11.75	0.00	0.00	0.00	0.00	0.00	0.00	11.75
		Unders	2.97	0.00	0.00	0.00	0.00	0.00	0.00	2.97
-15.88 + 1.30	-5/8 + 0.051	Feed	34.35	3.36	0.11	0.00	3.95	0.61	0.00	42.38
		Overs	22.93	0.69	0.14	0.00	0.91	0.31	0.00	24.98
		Unders	54.25	8.01	0.06	0.00	9.27	1.14	0.00	72.73
-1.30	-0.051	Feed	0.00	0.00	0.00	0.00	0.00	0.00	11.94	11.94
		Overs	0.00	0.00	0.00	0.00	0.00	0.00	5.05	5.05
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	23.94	23.94
Total	-	Feed	79.20	4.19	0.11	0.00	3.95	0.61	11.94	100.00
		Overs	91.89	2.00	0.14	0.00	0.91	0.31	5.05	100.00
		Unders	57.58	8.01	0.06	0.00	9.27	1.14	23.94	100.00

* R designates round sieve opening.

TABLE B-26. COMPONENT/SIZE DISTRIBUTION (12 rpm, feedrate = 3.62 Mg/h (3.98 tons/h), January 1981)
(% by weight)

B-27

Size class*		Material	Paper & plastic	Organic other	Nonferrous	Ferrous	Glass	Inorganic other	Fines (-1.30 mm)	Total
mm	in.									
+76.20	+3	Feed	15.79	0.00	0.00	0.00	0.00	0.00	0.00	15.79
		Overs	25.33	0.00	0.00	0.00	0.00	0.00	0.00	25.33
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-76.20 + 50.80	-3 + 2	Feed	24.83	0.10	0.00	0.00	0.00	0.00	0.00	24.93
		Overs	39.85	0.16	0.00	0.00	0.00	0.00	0.00	40.01
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-50.80 + 25.40	-2 + 1	Feed	12.69	0.00	0.00	0.00	0.00	0.00	0.00	12.69
		Overs	20.37	0.00	0.00	0.00	0.00	0.00	0.00	20.37
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-25.40 + 31.75R	-1 + 1-1/4R	Feed	1.41	0.00	0.00	0.00	0.00	0.00	0.00	1.41
		Overs	2.19	0.00	0.00	0.00	0.00	0.00	0.00	2.19
		Unders	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.12
-31.75R + 15.88	-1-1/4R + 5/8	Feed	6.34	0.02	0.05	0.00	0.00	0.00	0.00	6.41
		Overs	7.68	0.03	0.00	0.00	0.00	0.00	0.00	7.71
		Unders	4.13	0.00	0.14	0.00	0.00	0.00	0.00	4.27
-15.88 + 1.30	-5/8 + 0.051	Feed	14.64	3.69	0.03	0.00	5.36	0.82	0.00	24.54
		Overs	3.59	0.18	0.00	0.00	0.01	0.00	0.00	3.78
		Unders	32.90	9.49	0.07	0.00	14.21	2.17	0.00	58.84
-1.30	-0.051	Feed	0.00	0.00	0.00	0.00	0.00	0.00	14.23	14.23
		Overs	0.00	0.00	0.00	0.00	0.00	0.00	0.61	0.61
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	36.77	36.77
Total	-	Feed	75.70	3.81	0.08	0.00	5.36	0.82	14.23	100.00
		Overs	99.01	0.37	0.00	0.00	0.01	0.00	0.61	100.00
		Unders	37.15	9.49	0.21	0.00	14.21	2.17	36.77	100.00

* R designates round sieve opening.

TABLE B-27. COMPONENT/SIZE DISTRIBUTION (12 rpm, feedrate = 6.39 Mg/h (6.70 tons/h), January 1981)
(% by weight)

Size class*		Material	Paper & plastic	Organic other	Nonferrous	Ferrous	Glass	Inorganic other	Fines (-1.30 mm)	Total
mm	in.									
+76.20	+3	Feed	4.47	0.00	0.00	0.00	0.00	0.00	0.00	4.47
		Overs	9.31	0.00	0.00	0.00	0.00	0.00	0.00	9.31
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-76.20 + 50.80	-3 + 2	Feed	20.97	0.00	1.76	0.00	0.00	0.00	0.00	22.73
		Overs	43.71	0.00	3.66	0.00	0.00	0.00	0.00	47.37
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-50.80 + 25.40	-2 + 1	Feed	8.97	3.07	0.00	0.00	0.00	0.00	0.00	12.04
		Overs	18.69	6.39	0.00	0.00	0.00	0.00	0.00	25.08
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-25.40 + 31.75R	-1 + 1-1/4R	Feed	1.17	0.03	0.00	0.00	0.00	0.00	0.00	1.20
		Overs	1.51	0.06	0.00	0.00	0.00	0.00	0.00	1.57
		Unders	0.85	0.00	0.00	0.00	0.00	0.00	0.00	0.85
-31.75R + 15.88	-1-1/4R + 5/8	Feed	8.18	0.41	0.26	0.03	0.00	0.12	0.00	9.00
		Overs	7.89	0.86	0.00	0.06	0.00	0.00	0.00	8.81
		Unders	8.45	0.00	0.50	0.00	0.00	0.24	0.00	9.19
-15.88 + 1.30	-5/8 + 0.051	Feed	20.29	6.88	0.18	0.01	4.69	1.52	0.00	33.57
		Overs	4.24	2.34	0.00	0.00	0.01	0.00	0.00	6.59
		Unders	35.11	11.06	0.35	0.01	9.01	2.92	0.00	58.46
-1.30	-0.051	Feed	0.00	0.00	0.00	0.00	0.00	0.00	16.99	16.99
		Overs	0.00	0.00	0.00	0.00	0.00	0.00	1.27	1.27
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	31.50	31.50
Total	-	Feed	64.05	10.39	2.20	0.04	4.69	1.64	16.99	100.00
		Overs	85.35	9.65	3.66	0.06	0.01	0.00	1.27	100.00
		Unders	44.41	11.06	0.85	0.01	9.01	3.16	31.50	100.00

* R designates round sieve opening.

TABLE B-28. COMPONENT/SIZE DISTRIBUTION (12 rpm, feedrate = 6.69 Mg/h (7.36 tons/h), January 1981)
(% by weight)

B-29

Size class*		Material	Paper & plastic	Organic other	Nonferrous	Ferrous	Glass	Inorganic other	Fines (-1.30 mm)	Total
mm	in.									
+76.20	+3	Feed	9.69	0.00	0.00	0.00	0.00	0.00	0.00	9.69
		Overs	16.74	0.00	0.00	0.00	0.00	0.00	0.00	16.74
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-76.20 + 50.80	-3 + 2	Feed	12.55	0.05	0.00	0.00	0.00	0.00	0.00	12.60
		Overs	21.67	0.08	0.00	0.00	0.00	0.00	0.00	21.75
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-50.80 + 25.40	-2 + 1	Feed	19.21	0.36	0.00	0.00	0.00	0.00	0.00	19.57
		Overs	33.17	0.63	0.00	0.00	0.00	0.00	0.00	33.80
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-25.40 + 31.75R	-1 + 1-1/4R	Feed	1.43	0.33	0.00	0.00	0.00	0.00	0.00	1.76
		Overs	2.01	0.00	0.00	0.00	0.00	0.00	0.00	2.01
		Unders	0.64	0.79	0.00	0.00	0.00	0.00	0.00	1.43
-31.75R + 15.88	-1-1/4R + 5/8	Feed	8.54	0.38	0.24	0.00	0.00	0.00	0.00	9.16
		Overs	11.25	0.00	0.00	0.00	0.00	0.00	0.00	11.25
		Unders	4.82	0.91	0.57	0.00	0.00	0.00	0.00	6.30
-15.88 + 1.30	-5/8 + 0.051	Feed	27.06	4.31	0.21	0.00	3.16	0.00	0.00	34.74
		Overs	11.99	0.34	0.09	0.00	0.11	0.00	0.00	12.53
		Unders	47.77	9.77	0.38	0.00	7.36	0.00	0.00	65.28
-1.30	-0.051	Feed	0.00	0.00	0.00	0.00	0.00	0.00	12.48	12.48
		Overs	0.00	0.00	0.00	0.00	0.00	0.00	1.92	1.92
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	26.99	26.99
Total	-	Feed	78.48	5.43	0.45	0.00	3.16	0.00	12.48	100.00
		Overs	96.83	1.05	0.09	0.00	0.11	0.00	1.92	100.00
		Unders	53.23	11.47	0.95	0.00	7.36	0.00	26.99	100.00

* R designates round sieve opening.

TABLE B-29. COMPONENT/SIZE DISTRIBUTION (12 rpm, feedrate = 7.42 Mg/h (8.16 tons/h), January 1981)
(% by weight)

	Size class*		Material	Paper & plastic	Organic other	Nonferrous	Ferrous	Glass	Inorganic other	Fines (-1.30 mm)	Total
	mm	in.									
B-30	+76.20	+3	Feed	5.66	0.00	0.00	0.00	0.00	0.00	0.00	5.66
			Overs	11.01	0.00	0.00	0.00	0.00	0.00	0.00	11.01
			Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	-76.20 + 50.80	-3 + -2	Feed	17.39	0.00	0.00	0.00	0.00	0.00	0.00	17.39
			Overs	33.84	0.00	0.00	0.00	0.00	0.00	0.00	33.84
			Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	-50.80 + 25.40	-2 + -1	Feed	14.28	0.05	0.00	0.00	0.00	0.00	0.00	14.33
			Overs	27.78	0.09	0.00	0.00	0.00	0.00	0.00	27.87
			Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	-25.40 + 31.75R	-1 + -1-1/4R	Feed	1.47	0.44	0.00	0.00	0.00	0.00	0.00	1.91
			Overs	2.78	0.00	0.00	0.00	0.00	0.00	0.00	2.78
			Unders	0.09	0.91	0.00	0.00	0.00	0.00	0.00	1.00
	-31.75R + 15.88	-1-1/4R + 5/8	Feed	7.89	0.03	0.05	0.00	0.00	0.00	0.00	7.97
			Overs	12.75	0.05	0.10	0.00	0.00	0.00	0.00	12.90
			Unders	2.76	0.00	0.00	0.00	0.00	0.00	0.00	2.76
	-15.88 + 1.30	-5/8 + 0.051	Feed	23.12	5.16	0.01	0.00	8.16	0.00	0.00	36.45
			Overs	9.29	0.90	0.02	0.00	0.06	0.00	0.00	10.27
			Unders	37.75	9.66	0.00	0.00	16.72	0.00	0.00	64.13
	-1.30	-0.051	Feed	0.00	0.00	0.00	0.00	0.00	0.00	16.29	16.29
			Overs	0.00	0.00	0.00	0.00	0.00	0.00	1.33	1.33
			Unders	0.00	0.00	0.00	0.00	0.00	0.00	32.11	32.11
	Total	-	Feed	69.81	5.68	0.06	0.00	8.16	0.00	16.29	100.00
			Overs	97.45	1.04	0.12	0.00	0.06	0.00	1.33	100.00
			Unders	40.60	10.57	0.00	0.00	16.72	0.00	32.11	100.00

* R designates round sieve opening.

TABLE B-30. COMPONENT/SIZE DISTRIBUTION (12 rpm, feedrate = 17.64 Mg/h (19.40 tons/h), January 1981)
(% by weight)

	Size class*		Material	Paper & plastic	Organic other	Nonferrous	Ferrous	Glass	Inorganic other	Fines (-1.30 mm)	Total
	mm	in.									
B-31	+76.20	+3	Feed	2.99	0.54	0.00	0.00	0.00	0.00	0.00	3.53
			Overs	5.40	0.97	0.00	0.00	0.00	0.00	0.00	6.37
			Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	-76.20 + 50.80	-3 + 2	Feed	12.44	0.07	0.00	0.00	0.00	0.00	0.00	12.51
			Overs	22.46	0.13	0.00	0.00	0.00	0.00	0.00	22.59
			Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	-50.80 + 25.40	-2 + 1	Feed	6.23	0.00	0.00	0.00	0.00	0.00	0.00	6.23
			Overs	11.25	0.00	0.00	0.00	0.00	0.00	0.00	11.25
			Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	-25.40 + 31.75R	-1 + 1-1/4R	Feed	3.97	0.00	0.00	0.00	0.00	0.00	0.00	3.97
			Overs	4.49	0.00	0.00	0.00	0.00	0.00	0.00	4.49
			Unders	3.33	0.00	0.00	0.00	0.00	0.00	0.00	3.33
	-31.75R + 15.88	-1-1/4R + 5/8	Feed	10.91	0.00	0.27	0.00	0.00	0.00	0.00	11.18
			Overs	17.59	0.00	0.00	0.00	0.00	0.00	0.00	17.59
			Unders	2.62	0.00	0.60	0.00	0.00	0.00	0.00	3.22
	-15.88 + 1.30	-5/8 + 0.051	Feed	34.93	4.44	0.25	0.00	8.22	0.15	0.00	47.99
			Overs	28.10	2.74	0.46	0.00	0.70	0.14	0.00	32.14
			Unders	43.41	6.54	0.00	0.00	17.56	0.15	0.00	67.66
	-1.30	-0.051	Feed	0.00	0.00	0.00	0.00	0.00	0.00	14.59	14.59
			Overs	0.00	0.00	0.00	0.00	0.00	0.00	5.57	5.57
			Unders	0.00	0.00	0.00	0.00	0.00	0.00	25.79	25.79
	Total	-	Feed	71.47	5.05	0.52	0.00	8.22	0.15	14.59	100.00
			Overs	89.29	3.84	0.46	0.00	0.70	0.14	5.57	100.00
			Unders	49.36	6.54	0.60	0.00	17.56	0.15	25.79	100.00

* R designates round sieve opening.

TABLE B-31. COMPONENT/SIZE DISTRIBUTION (6 rpm, feedrate = 2.82 Mg/h (3.10 tons/h), May 1981)
(% by weight)

Size class*		Material	Paper & plastic	Organic other	Nonferrous	Ferrous	Glass	Inorganic other	Fines (-1.30 mm)	Total
mm	in.									
+76.20	+3	Feed	8.59	0.00	0.00	0.00	0.00	0.00	0.00	8.59
		Overs	22.48	0.00	0.00	0.00	0.00	0.00	0.00	22.48
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-76.20 + 50.80	-3 + 2	Feed	11.40	0.00	0.00	0.00	0.00	0.00	0.00	11.40
		Overs	29.85	0.00	0.00	0.00	0.00	0.00	0.00	29.85
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-50.80 + 25.40	-2 + 1	Feed	9.96	0.00	0.42	0.00	0.00	0.00	0.00	10.38
		Overs	26.08	0.00	1.11	0.00	0.00	0.00	0.00	27.19
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-25.40 + 31.75R	-1 + 1.25R	Feed	1.15	0.00	0.08	0.00	0.00	0.00	0.00	1.23
		Overs	2.91	0.00	0.20	0.00	0.00	0.00	0.00	3.11
		Unders	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.07
-31.75R + 12.70	-1.25R + 0.50	Feed	10.21	0.44	0.72	0.00	0.00	0.00	0.00	11.37
		Overs	11.48	0.38	0.00	0.00	0.00	0.00	0.00	11.86
		Unders	9.42	0.47	1.16	0.00	0.00	0.00	0.00	11.05
-12.70 + 9.53	-0.50 + 0.375	Feed	6.65	0.56	0.02	0.00	0.00	0.00	0.00	7.23
		Overs	2.33	0.03	0.00	0.00	0.00	0.00	0.00	2.36
		Unders	9.32	0.89	0.04	0.00	0.00	0.00	0.00	10.25
-9.53 + 5.14	-0.375 + 0.202	Feed	11.64	0.49	0.01	0.00	0.00	0.00	0.00	12.14
		Overs	1.16	0.07	0.00	0.00	0.00	0.00	0.00	1.23
		Unders	18.11	0.75	0.01	0.00	0.00	0.00	0.00	18.87
-5.14 + 2.74	-0.202 + 0.108	Feed	3.26	4.04	0.02	0.00	0.77	0.00	0.00	8.09
		Overs	0.00	0.21	0.00	0.00	0.00	0.00	0.00	0.21
		Unders	5.27	6.40	0.04	0.00	1.24	0.00	0.00	12.95
-2.74 + 1.30	-0.108 + 0.051	Feed	0.00	5.75	0.00	0.00	4.54	0.00	0.00	10.29
		Overs	0.00	0.21	0.00	0.00	0.00	0.00	0.00	0.21
		Unders	0.00	9.18	0.00	0.00	7.34	0.00	0.00	16.52
-1.30	-0.051	Feed	0.00	0.00	0.00	0.00	0.00	0.00	19.28	19.28
		Overs	0.00	0.00	0.00	0.00	0.00	0.00	1.50	1.50
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	30.29	30.29
Total	-	Feed	62.86	11.28	1.27	0.00	5.31	0.00	19.28	100.00
		Overs	96.29	0.90	1.31	0.00	0.00	0.00	1.50	100.00
		Unders	42.19	17.69	1.25	0.00	8.58	0.00	30.29	100.00

* R designates round sieve opening.

TABLE B-32. COMPONENT/SIZE DISTRIBUTION (6 rpm, Feedrate = 5.05 Mg/h (5.56 tons/h), May 1981)
(% by weight)

	Size class*		Material	Paper & plastic	Organic other	Nonferrous	Ferrous	Glass	Inorganic other	Fines (-1.30 mm)	Total
	mm	in.									
B-33	+76.20	+3	Feed	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Overs	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	-76.20 + 50.80	-3 + 2	Feed	3.29	0.00	0.00	0.00	0.00	0.00	0.00	3.29
			Overs	10.99	0.00	0.00	0.00	0.00	0.00	0.00	10.99
			Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	-50.80 + 25.40	-2 + 1	Feed	6.25	0.03	0.00	0.00	0.00	0.00	0.00	6.28
			Overs	20.90	0.10	0.00	0.00	0.00	0.00	0.00	21.00
			Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	-25.40 + 31.75R	-1 + 1.25R	Feed	2.18	0.00	0.00	0.00	0.00	0.00	0.00	2.18
			Overs	2.66	0.00	0.00	0.00	0.00	0.00	0.00	2.66
			Unders	1.98	0.00	0.00	0.00	0.00	0.00	0.00	1.98
	-31.75R + 12.70	-1.25R + 0.50	Feed	12.97	0.38	0.00	0.00	0.00	0.00	0.00	13.35
			Overs	28.56	0.61	0.00	0.00	0.00	0.00	0.00	29.17
			Unders	6.32	0.28	0.00	0.00	0.00	0.00	0.00	6.60
	-12.70 + 9.53	-0.50 + 0.375	Feed	7.46	0.48	0.00	0.00	0.00	1.27	0.00	9.21
			Overs	8.81	0.50	0.00	0.00	0.00	0.00	0.00	9.31
			Unders	6.89	0.47	0.00	0.00	0.00	1.81	0.00	9.17
	-9.53 + 5.14	-0.375 + 0.202	Feed	14.96	0.92	0.10	0.00	0.14	0.00	0.00	16.12
			Overs	10.79	0.79	0.00	0.00	0.00	0.00	0.00	11.58
			Unders	16.74	0.98	0.14	0.00	0.20	0.00	0.00	18.06
	-5.14 + 2.74	-0.202 + 0.108	Feed	4.22	3.81	0.02	0.00	1.77	0.09	0.00	9.91
			Overs	1.48	1.81	0.00	0.00	0.09	0.00	0.00	3.38
			Unders	5.39	4.66	0.03	0.00	2.49	0.13	0.00	12.70
	-2.74 + 1.30	-0.108 + 0.051	Feed	0.00	6.71	0.00	0.00	6.47	0.69	0.00	13.87
			Overs	0.00	3.21	0.00	0.00	0.69	0.00	0.00	3.90
			Unders	0.00	8.20	0.00	0.00	8.93	0.99	0.00	18.12
	-1.30	-0.051	Feed	0.00	0.00	0.00	0.00	0.00	0.00	25.79	25.79
			Overs	0.00	0.00	0.00	0.00	0.00	0.00	8.01	8.01
			Unders	0.00	0.00	0.00	0.00	0.00	0.00	33.37	33.37
Total			Feed	51.33	12.33	0.12	0.00	8.38	2.05	25.79	100.00
			Overs	84.19	7.02	0.00	0.00	0.78	0.00	8.01	100.00
			Unders	37.32	14.59	0.17	0.00	11.62	2.93	33.37	100.00

* R designates round sieve opening.

TABLE B-33. COMPONENT/SIZE DISTRIBUTION (6 rpm, feedrate = 5.21 Mg/h (5.73 tons/h), May 1981)
(% by weight)

Size class*		Material	Paper & plastic	Organic other	Nonferrous	Ferrous	Glass	Inorganic other	Fines (-1.30 mm)	Total
mm	in.									
+76.20	+3	Feed	1.86	0.00	0.00	0.00	0.00	0.00	0.00	1.86
		Overs	9.84	0.00	0.00	0.00	0.00	0.00	0.00	9.84
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-76.20 + 50.80	-3 + 2	Feed	4.41	0.00	0.46	0.00	0.00	0.00	0.00	4.87
		Overs	23.30	0.00	2.43	0.00	0.00	0.00	0.00	25.73
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-50.80 + 25.40	-2 + 1	Feed	7.47	0.87	0.00	0.00	0.00	0.00	0.00	8.34
		Overs	39.54	4.60	0.00	0.00	0.00	0.00	0.00	44.14
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-25.40 + 31.75R	-1 + 1.25R	Feed	0.55	0.20	0.00	0.00	0.00	0.00	0.00	0.75
		Overs	1.69	1.06	0.00	0.00	0.00	0.00	0.00	2.75
		Unders	0.29	0.00	0.00	0.00	0.00	0.00	0.00	0.29
-31.75R + 12.70	-1.25R + 0.50	Feed	8.72	1.36	0.00	0.00	0.00	0.00	0.00	10.08
		Overs	13.01	0.85	0.00	0.00	0.00	0.00	0.00	13.86
		Unders	7.72	1.48	0.00	0.00	0.00	0.00	0.00	9.20
-12.70 + 9.53	-0.50 + 0.375	Feed	6.78	0.82	0.00	0.00	0.00	0.11	0.00	7.71
		Overs	1.25	0.46	0.00	0.00	0.00	0.00	0.00	1.71
		Unders	8.07	0.90	0.00	0.00	0.00	0.14	0.00	9.11
-9.53 + 5.14	-0.375 + 0.202	Feed	14.82	1.19	0.03	0.00	0.00	0.00	0.00	16.04
		Overs	0.47	0.08	0.00	0.00	0.00	0.00	0.00	0.55
		Unders	18.16	1.45	0.04	0.00	0.00	0.00	0.00	19.65
-5.14 + 2.74	-0.202 + 0.108	Feed	5.39	6.49	0.01	0.00	0.32	0.03	0.00	12.24
		Overs	0.00	0.17	0.00	0.00	0.00	0.00	0.00	0.17
		Unders	6.65	7.96	0.01	0.00	0.40	0.04	0.00	15.06
-2.74 + 1.30	-0.108 + 0.051	Feed	0.00	10.53	0.00	0.00	2.59	0.29	0.00	13.41
		Overs	0.00	0.14	0.00	0.00	0.00	0.00	0.00	0.14
		Unders	0.00	12.95	0.00	0.00	3.19	0.36	0.00	16.50
-1.30	-0.051	Feed	0.00	0.00	0.00	0.00	0.00	0.00	24.70	24.70
		Overs	0.00	0.00	0.00	0.00	0.00	0.00	1.11	1.11
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	30.19	30.19
Total	-	Feed	50.00	21.46	0.50	0.00	2.91	0.43	24.70	100.00
		Overs	89.10	7.36	2.43	0.00	0.00	0.00	1.11	100.00
		Unders	40.89	24.74	0.05	0.00	3.59	0.54	30.19	100.00

* R designates round sieve opening.

TABLE B-34. COMPONENT/SIZE DISTRIBUTION (6 rpm, feedrate = 26.44 Mg/h (29.08 tons/h), May 1981)
(% by weight)

	Size class*		Material	Paper & plastic	Organic other	Nonferrous	Ferrous	Glass	Inorganic other	Fines (-1.30 mm)	Total
	mm	in.									
B-35	+76.20	+3	Feed	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Overs	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	-76.20 + 50.80	-3 + 2	Feed	2.37	0.00	0.00	0.00	0.00	0.00	0.00	2.37
			Overs	2.99	0.00	0.00	0.00	0.00	0.00	0.00	2.99
			Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	-50.80 + 25.40	-2 + 1	Feed	6.25	1.20	0.00	0.00	0.00	0.00	0.00	7.45
			Overs	7.88	1.51	0.00	0.00	0.00	0.00	0.00	9.39
			Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	-25.40 + 31.75R	-1 + 1.25R	Feed	0.96	0.10	0.00	0.00	0.00	0.00	0.00	1.06
			Overs	1.21	0.12	0.00	0.00	0.00	0.00	0.00	1.33
			Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	-31.75R + 12.70	-1.25R + 0.50	Feed	10.78	2.36	0.00	0.00	0.00	0.00	0.00	13.14
			Overs	12.50	2.97	0.00	0.00	0.00	0.00	0.00	15.47
			Unders	4.17	0.00	0.00	0.00	0.00	0.00	0.00	4.17
	-12.70 + 9.53	-0.50 + 0.375	Feed	5.46	0.84	0.00	0.00	0.00	0.00	0.00	6.30
			Overs	5.47	0.93	0.00	0.00	0.00	0.00	0.00	6.40
			Unders	5.42	0.51	0.00	0.00	0.00	0.00	0.00	5.93
	-9.53 + 5.14	-0.375 + 0.202	Feed	9.12	1.12	0.04	0.00	0.28	0.07	0.00	10.63
			Overs	8.55	1.03	0.03	0.00	0.25	0.08	0.00	9.94
			Unders	11.30	1.47	0.10	0.00	0.41	0.03	0.00	13.31
	-5.14 + 2.74	-0.202 + 0.108	Feed	1.59	4.49	0.00	0.00	2.33	0.17	0.00	8.58
			Overs	1.33	4.12	0.00	0.00	1.96	0.22	0.00	7.63
			Unders	2.58	5.91	0.02	0.00	3.76	0.00	0.00	12.27
	-2.74 + 1.30	-0.108 + 0.051	Feed	0.00	7.63	0.00	0.00	7.11	0.39	0.00	15.13
			Overs	0.00	6.77	0.00	0.00	6.85	0.38	0.00	14.00
			Unders	0.00	10.94	0.00	0.00	8.14	0.42	0.00	19.50
	-1.30	-0.051	Feed	0.00	0.00	0.00	0.00	0.00	0.00	35.34	35.34
			Overs	0.00	0.00	0.00	0.00	0.00	0.00	32.85	32.85
			Unders	0.00	0.00	0.00	0.00	0.00	0.00	44.82	44.82
	Total	-	Feed	36.53	17.74	0.04	0.00	9.72	0.63	35.34	100.00
			Overs	39.93	17.45	0.03	0.00	9.06	0.68	32.85	100.00
			Unders	23.47	18.83	0.12	0.00	12.31	0.45	44.82	100.00

* R designates round sieve opening.

TABLE B-35. COMPONENT/SIZE DISTRIBUTION (6 rpm, feedrate = 29.56 Mg/h (32.52 tons/h), May 1981)
(% by weight)

mm	Size class*		Material	Paper & plastic	Organic other	Nonferrous	Ferrous	Glass	Inorganic other	Fines (-1.30 mm)	Total
	in.										
+76.20	+3		Feed	0.44	0.00	0.00	0.00	0.00	0.00	0.00	0.44
			Overs	0.54	0.00	0.00	0.00	0.00	0.00	0.00	0.54
			Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-76.20 + 50.80	-3 + 2		Feed	7.50	0.00	0.00	0.00	0.00	0.00	0.00	7.50
			Overs	9.30	0.00	0.00	0.00	0.00	0.00	0.00	9.30
			Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-50.80 + 25.40	-2 + 1		Feed	9.12	0.00	0.00	0.00	0.00	0.00	0.00	9.12
			Overs	11.31	0.00	0.00	0.00	0.00	0.00	0.00	11.31
			Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-25.40 + 31.75R	-1 + 1.25R		Feed	1.72	0.00	0.00	0.00	0.00	0.00	0.00	1.72
			Overs	2.13	0.00	0.00	0.00	0.00	0.00	0.00	2.13
			Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-31.75R + 12.70	-1.25R + 0.50		Feed	18.91	1.64	0.00	0.00	0.00	0.00	0.00	20.55
			Overs	21.81	1.89	0.00	0.00	0.00	0.00	0.00	23.70
			Unders	6.86	0.62	0.00	0.00	0.00	0.00	0.00	7.48
-12.70 + 9.53	-0.50 + 0.375		Feed	10.27	0.79	0.00	0.00	0.00	0.00	0.00	11.06
			Overs	10.80	0.83	0.00	0.00	0.00	0.00	0.00	11.63
			Unders	8.07	0.61	0.00	0.00	0.00	0.00	0.00	8.68
-9.53 + 5.14	-0.375 + 0.202		Feed	15.18	1.00	0.07	0.00	0.03	0.10	0.00	16.38
			Overs	14.57	1.09	0.06	0.00	0.00	0.00	0.00	15.72
			Unders	17.71	1.14	0.10	0.00	0.14	0.05	0.00	19.14
-5.14 + 2.74	-0.202 + 0.108		Feed	4.74	3.47	0.00	0.00	0.55	0.14	0.00	8.90
			Overs	4.05	3.05	0.00	0.00	0.25	0.13	0.00	7.48
			Unders	7.62	5.19	0.02	0.00	1.80	0.20	0.00	14.83
-2.74 + 1.30	-0.108 + 0.051		Feed	0.00	6.19	0.00	0.00	1.89	0.11	0.00	8.19
			Overs	0.00	5.16	0.00	0.00	1.11	0.00	0.00	6.27
			Unders	0.00	10.45	0.01	0.00	5.12	0.57	0.00	16.15
-1.30	-0.051		Feed	0.00	0.00	0.00	0.00	0.00	0.00	16.14	16.14
			Overs	0.00	0.00	0.00	0.00	0.00	0.00	11.92	11.92
			Unders	0.00	0.00	0.00	0.00	0.00	0.00	33.72	33.72
Total			Feed	67.88	13.09	0.07	0.00	2.47	0.35	16.14	100.00
			Overs	74.51	12.02	0.06	0.00	1.36	0.13	11.92	100.00
			Unders	40.26	13.08	0.13	0.00	7.06	0.82	33.72	100.00

* R designates round sieve opening.

TABLE B-36. COMPONENT/SIZE DISTRIBUTION (9 rpm, feedrate = 6.32 Mg/h (6.97 tons/h), May 1981)
(% by weight)

Size class*		Material	Paper & plastic	Organic other	Nonferrous	Ferrous	Glass	Inorganic other	Fines (-1.30 mm)	Total
mm	in.									
+76.20	+3	Feed	1.98	0.00	0.00	0.00	0.00	0.00	0.00	1.98
		Overs	6.79	0.00	0.00	0.00	0.00	0.00	0.00	6.79
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-76.20 + 50.80	-3 + 2	Feed	9.69	0.00	0.00	0.00	0.00	0.00	0.00	9.69
		Overs	33.30	0.00	0.00	0.00	0.00	0.00	0.00	33.30
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-50.80 + 25.40	-2 + 1	Feed	9.11	0.00	0.00	0.00	0.00	0.00	0.00	9.11
		Overs	31.32	0.00	0.00	0.00	0.00	0.00	0.00	31.32
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-25.40 + 31.75R	-1 + 1.25R	Feed	0.87	0.00	0.00	0.00	0.00	0.00	0.00	0.87
		Overs	2.90	0.00	0.00	0.00	0.00	0.00	0.00	2.90
		Unders	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.03
-31.75R + 12.70	-1.25R + 0.50	Feed	13.18	1.67	0.00	0.00	0.00	0.00	0.00	14.85
		Overs	19.17	1.41	0.00	0.00	0.00	0.00	0.00	20.58
		Unders	10.72	1.77	0.00	0.00	0.00	0.00	0.00	12.49
-12.70 + 9.53	-0.50 + 0.375	Feed	7.00	0.38	0.00	0.00	0.00	0.00	0.00	7.38
		Overs	1.68	0.18	0.00	0.00	0.00	0.00	0.00	1.86
		Unders	9.18	0.46	0.00	0.00	0.00	0.00	0.00	9.64
-9.53 + 5.14	-0.375 + 0.202	Feed	14.01	0.35	0.01	0.08	0.04	0.00	0.00	14.49
		Overs	1.28	0.08	0.00	0.00	0.00	0.00	0.00	1.36
		Unders	19.24	0.46	0.02	0.11	0.06	0.00	0.00	19.89
-5.14 + 2.74	-0.202 + 0.108	Feed	5.98	3.37	0.00	0.02	0.36	0.00	0.00	9.73
		Overs	0.00	0.36	0.00	0.00	0.00	0.00	0.00	0.36
		Unders	8.44	4.61	0.00	0.03	0.51	0.00	0.00	13.59
-2.74 + 1.30	-0.108 + 0.051	Feed	0.00	9.30	0.00	0.00	1.96	0.00	0.00	11.26
		Overs	0.00	0.37	0.00	0.00	0.00	0.00	0.00	0.37
		Unders	0.00	12.97	0.00	0.00	2.77	0.00	0.00	15.74
-1.30	-0.051	Feed	0.00	0.00	0.00	0.00	0.00	0.00	20.64	20.64
		Overs	0.00	0.00	0.00	0.00	0.00	0.00	1.16	1.16
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	28.62	28.62
Total	-	Feed	61.82	15.07	0.01	0.10	2.36	0.00	20.64	100.00
		Overs	96.44	2.40	0.00	0.00	0.00	0.00	1.16	100.00
		Unders	47.61	20.27	0.02	0.14	3.34	0.00	28.62	100.00

* R designates round sieve opening.

TABLE B-37. COMPONENT/SIZE DISTRIBUTION (9 rpm, feedrate = 6.48 Mg/h (7.13 tons/h), May 1981)
(% by weight)

	Size class*		Material	Paper & plastic	Organic other	Nonferrous	Ferrous	Glass	Inorganic other	Fines (-1.30 mm)	Total
	mm	in.									
B-38	+76.20	+3	Feed	2.54	0.00	0.00	0.00	0.00	0.00	0.00	2.54
			Overs	4.83	0.00	0.00	0.00	0.00	0.00	0.00	4.83
			Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	-76.20 + 50.80	-3 + 2	Feed	4.48	0.00	0.00	0.00	0.00	0.00	0.00	4.48
			Overs	3.51	0.00	0.00	0.00	0.00	0.00	0.00	8.51
			Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	-50.80 + 25.40	-2 + 1	Feed	15.33	0.07	0.00	0.00	0.00	0.00	0.00	15.40
			Overs	29.14	0.13	0.00	0.00	0.00	0.00	0.00	29.27
			Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	-25.40 + 31.75R	-1 + 1.25R	Feed	1.61	0.00	0.00	0.00	0.00	0.00	0.00	1.61
			Overs	3.05	0.00	0.00	0.00	0.00	0.00	0.00	3.05
			Unders	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.02
	-31.75R + 12.70	-1.25R + 0.50	Feed	19.47	1.62	0.27	0.12	0.00	0.00	0.00	21.48
			Overs	28.94	0.35	0.00	0.23	0.00	0.00	0.00	29.52
			Unders	8.97	3.02	0.57	0.00	0.00	0.00	0.00	12.56
	-12.70 + 9.53	-0.50 + 0.375	Feed	7.23	0.60	0.00	0.00	0.00	0.00	0.00	7.83
			Overs	6.38	0.69	0.00	0.00	0.00	0.00	0.00	7.07
			Unders	8.17	0.50	0.00	0.00	0.00	0.00	0.00	8.67
	-9.53 + 5.14	-0.375 + 0.202	Feed	11.37	0.89	0.07	0.08	0.00	0.08	0.00	12.49
			Overs	7.24	0.00	0.00	0.00	0.00	0.00	0.00	7.24
			Unders	15.96	1.88	0.14	0.17	0.00	0.16	0.00	18.31
	-5.14 + 2.74	-0.202 + 0.108	Feed	3.42	3.15	0.00	0.00	0.59	0.04	0.00	7.20
			Overs	1.53	1.28	0.00	0.00	0.06	0.07	0.00	2.94
			Unders	5.51	5.23	0.00	0.00	1.18	0.00	0.00	11.92
	-2.74 + 1.30	-0.108 + 0.051	Feed	0.00	7.38	0.00	0.00	2.04	0.00	0.00	9.42
			Overs	0.00	2.39	0.00	0.00	0.19	0.00	0.00	2.58
			Unders	0.00	12.92	0.00	0.00	4.10	0.00	0.00	17.02
	-1.30	-0.051	Feed	0.00	0.00	0.00	0.00	0.00	0.00	17.55	17.55
			Overs	0.00	0.00	0.00	0.00	0.00	0.00	4.99	4.99
			Unders	0.00	0.00	0.00	0.00	0.00	0.00	31.50	31.50
	Total	-	Feed	65.45	13.71	0.34	0.20	2.63	0.12	17.55	100.00
			Overs	89.62	4.84	0.00	0.23	0.25	0.07	4.99	100.00
			Unders	38.63	23.55	0.71	0.17	5.28	0.16	31.50	100.00

* R designates round sieve opening.

TABLE B-38. COMPONENT/SIZE DISTRIBUTION (9 rpm, feedrate = 8.56 Mg/h (9.42 tons/h), May 1981)
(% by weight)

Size class*		Material	Paper & plastic	Organic other	Nonferrous	Ferrous	Glass	Inorganic other	Fines (-1.30 mm)	Total
mm	in.									
+76.20	+3	Feed	3.46	0.00	0.00	0.00	0.00	0.00	0.00	3.46
		Overs	6.58	0.00	0.00	0.00	0.00	0.00	0.00	6.58
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-76.20 + 50.80	-3 + 2	Feed	9.55	0.11	0.00	0.00	0.00	0.00	0.00	9.66
		Overs	18.16	0.20	0.00	0.00	0.00	0.00	0.00	18.36
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-50.80 + 25.40	-2 + 1	Feed	11.27	0.47	0.87	0.00	0.00	0.00	0.00	12.61
		Overs	21.42	0.90	1.66	0.00	0.00	0.00	0.00	23.98
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-25.40 + 31.75R	-1 + 1.25R	Feed	1.37	0.00	0.00	0.00	0.00	0.00	0.00	1.37
		Overs	2.58	0.00	0.00	0.00	0.00	0.00	0.00	2.58
		Unders	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.02
-31.75R + 12.70	-1.25R + 0.50	Feed	18.41	0.88	0.00	0.00	0.00	0.00	0.00	19.29
		Overs	24.21	1.57	0.00	0.00	0.00	0.00	0.00	25.78
		Unders	11.95	0.11	0.00	0.00	0.00	0.00	0.00	12.06
-12.70 + 9.53	-0.50 + 0.375	Feed	8.90	0.61	0.09	0.00	0.00	0.00	0.00	9.60
		Overs	6.24	0.54	0.00	0.00	0.00	0.00	0.00	6.78
		Unders	11.87	0.69	0.18	0.00	0.00	0.00	0.00	12.74
-9.53 + 5.14	-0.375 + 0.202	Feed	14.17	0.40	0.02	0.00	0.12	0.05	0.00	14.76
		Overs	7.38	0.30	0.00	0.00	0.00	0.00	0.00	7.68
		Unders	21.72	0.51	0.04	0.00	0.25	0.11	0.00	22.63
-5.14 + 2.74	-0.202 + 0.108	Feed	5.43	1.68	0.00	0.00	0.06	0.03	0.00	7.20
		Overs	2.18	0.47	0.00	0.00	0.00	0.00	0.00	2.65
		Unders	9.03	3.02	0.00	0.00	0.13	0.07	0.00	12.25
-2.74 + 1.30	-0.108 + 0.051	Feed	0.58	5.17	0.00	0.00	1.17	0.00	0.00	6.92
		Overs	1.10	0.87	0.00	0.00	0.00	0.00	0.00	1.97
		Unders	0.00	9.95	0.00	0.00	2.46	0.00	0.00	12.41
-1.30	-0.051	Feed	0.00	0.00	0.00	0.00	0.00	0.00	15.13	15.13
		Overs	0.00	0.00	0.00	0.00	0.00	0.00	3.64	3.64
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	27.89	27.89
Total	-	Feed	73.14	9.32	0.98	0.00	1.35	0.08	15.13	100.00
		Overs	89.85	4.85	1.66	0.00	0.00	0.00	3.64	100.00
		Unders	54.59	14.28	0.22	0.00	2.84	0.18	27.89	100.00

* R designates round sieve opening.

TABLE B-39. COMPONENT SIZE DISTRIBUTION (9 rpm, feedrate = 31.67 Mg/h (34.84 tons/h), May 1981)
(% by weight)

	Size class*		Material	Paper & plastic	Organic other	Nonferrous	Ferrous	Glass	Inorganic other	Fines (-1.30 mm)	Total
	mm	in.									
B-40	+76.20	+3	Feed	2.42	0.00	0.00	0.00	0.00	0.00	0.00	2.42
			Overs	3.59	0.00	0.00	0.00	0.00	0.00	0.00	3.59
			Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	-76.20 + 50.80	-3 + 2	Feed	14.21	0.00	2.06	0.00	0.00	0.00	0.00	16.27
			Overs	21.10	0.00	3.05	0.00	0.00	0.00	0.00	24.15
			Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	-50.80 + 25.40	-2 + 1	Feed	9.43	0.00	0.00	0.00	0.00	0.00	0.00	9.43
			Overs	13.99	0.00	0.00	0.00	0.00	0.00	0.00	13.99
			Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	-25.40 + 31.75R	-1 + 1.25R	Feed	1.67	0.00	0.00	0.00	0.00	0.00	0.00	1.67
			Overs	2.37	0.00	0.00	0.00	0.00	0.00	0.00	2.37
			Unders	0.21	0.00	0.00	0.00	0.00	0.00	0.00	0.21
	-31.75R + 12.70	-1.25R + 0.50	Feed	13.69	0.46	0.00	0.00	0.00	0.00	0.00	14.15
			Overs	18.48	0.52	0.00	0.00	0.00	0.00	0.00	19.00
			Unders	3.81	0.33	0.00	0.00	0.00	0.00	0.00	4.14
	-12.70 + 9.53	-0.50 + 0.375	Feed	6.73	0.26	0.00	0.00	0.00	0.00	0.00	6.99
			Overs	7.02	0.27	0.00	0.00	0.00	0.00	0.00	7.29
			Unders	6.17	0.23	0.00	0.00	0.00	0.00	0.00	6.40
	-9.53 + 5.14	-0.375 + 0.202	Feed	12.57	0.44	0.02	0.00	0.30	0.12	0.00	13.45
			Overs	9.83	0.33	0.00	0.00	0.06	0.18	0.00	10.40
			Unders	18.22	0.67	0.05	0.00	0.80	0.00	0.00	19.74
	-5.14 + 2.74	-0.202 + 0.108	Feed	4.51	1.96	0.01	0.00	1.45	0.01	0.00	7.94
			Overs	2.52	1.32	0.00	0.00	0.46	0.01	0.00	4.31
			Unders	8.60	3.27	0.02	0.00	3.51	0.00	0.00	15.40
	-2.74 + 1.30	-0.108 + 0.051	Feed	0.00	6.00	0.00	0.00	3.05	0.00	0.00	9.05
			Overs	0.00	3.47	0.00	0.00	1.16	0.00	0.00	4.63
			Unders	0.00	11.22	0.00	0.00	6.96	0.00	0.00	18.18
	-1.30	-0.051	Feed	0.00	0.00	0.00	0.00	0.00	0.00	18.63	18.63
			Overs	0.00	0.00	0.00	0.00	0.00	0.00	10.27	10.27
			Unders	0.00	0.00	0.00	0.00	0.00	0.00	35.93	35.93
	Total	-	Feed	65.23	9.12	2.09	0.00	4.80	0.13	18.63	100.00
			Overs	78.90	5.91	3.05	0.00	1.68	0.19	10.27	100.00
			Unders	37.01	15.72	0.07	0.00	11.27	0.00	35.93	100.00

* R designates round sieve opening.

TABLE B-40. COMPONENT/SIZE DISTRIBUTION (9 rpm, feedrate = 32.90 Mg/h (36.19 tons/h), May 1981)
(% by weight)

	Size class*		Material	Paper & plastic	Organic other	Nonferrous	Ferrous	Glass	Inorganic other	Fines (-1.30 mm)	Total
	mm	in.									
+76.20	+3		Feed	4.80	19.32	0.00	0.00	0.00	0.00	0.00	24.12
			Overs	6.45	25.97	0.00	0.00	0.00	0.00	0.00	32.42
			Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-76.20 + 50.80	-3 + 2		Feed	6.82	0.00	0.00	0.00	0.00	0.00	0.00	6.82
			Overs	9.17	0.00	0.00	0.00	0.00	0.00	0.00	9.17
			Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-50.80 + 25.40	-2 + 1		Feed	6.89	0.06	0.00	0.00	0.00	0.00	0.00	6.95
			Overs	9.25	0.08	0.00	0.00	0.00	0.00	0.00	9.33
			Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-25.40 + 31.75R	-1 + 1.25R		Feed	0.69	0.00	0.00	0.00	0.00	0.00	0.00	0.69
			Overs	0.86	0.00	0.00	0.00	0.00	0.00	0.00	0.86
			Unders	0.19	0.00	0.00	0.00	0.00	0.00	0.00	0.19
-31.75R + 12.70	-1.25R + 0.50		Feed	9.98	0.69	0.00	0.00	0.00	0.00	0.00	10.67
			Overs	12.20	0.85	0.00	0.00	0.00	0.00	0.00	13.05
			Unders	3.53	0.23	0.00	0.00	0.00	0.00	0.00	3.76
-12.70 + 9.53	-0.50 + 0.375		Feed	4.29	0.13	0.00	0.00	0.00	0.00	0.00	4.42
			Overs	3.79	0.07	0.00	0.00	0.00	0.00	0.00	3.86
			Unders	5.76	0.32	0.00	0.00	0.00	0.00	0.00	6.08
-9.53 + 5.14	-0.375 + 0.202		Feed	6.98	0.45	0.02	0.00	0.46	0.15	0.00	8.06
			Overs	5.29	0.36	0.03	0.00	0.10	0.00	0.00	5.78
			Unders	11.87	0.72	0.00	0.00	1.50	0.58	0.00	14.67
-5.14 + 2.74	-0.202 + 0.108		Feed	0.89	4.09	0.00	0.00	1.67	0.00	0.00	6.65
			Overs	0.00	3.72	0.00	0.00	0.50	0.00	0.00	4.22
			Unders	3.46	5.18	0.00	0.00	5.08	0.00	0.00	13.72
-2.74 + 1.30	-0.108 + 0.051		Feed	0.00	6.03	0.00	0.00	2.96	0.00	0.00	8.99
			Overs	0.00	4.68	0.00	0.00	1.25	0.00	0.00	5.93
			Unders	0.00	9.95	0.00	0.00	7.93	0.00	0.00	17.88
-1.30	-0.051		Feed	0.00	0.00	0.00	0.00	0.00	0.00	22.63	22.63
			Overs	0.00	0.00	0.00	0.00	0.00	0.00	15.38	15.38
			Unders	0.00	0.00	0.00	0.00	0.00	0.00	43.70	43.70
Total			Feed	41.34	30.77	0.02	0.00	5.09	0.15	22.63	100.00
			Overs	47.01	35.73	0.03	0.00	1.85	0.00	15.38	100.00
			Unders	24.81	16.40	0.00	0.00	14.51	0.58	43.70	100.00

* R designates round sieve opening.

TABLE B-41. COMPONENT/SIZE DISTRIBUTION (12 rpm, feedrate = 2.92 Mg/h (3.21 tons/h), May 1981)
(% by weight)

mm	Size class*		Material	Paper & plastic	Organic other	Nonferrous	Ferrous	Glass	Inorganic other	Fines (-1.30 mm)	Total
	in.										
+76.20	+3	Feed	13.63	0.00	0.00	0.00	0.00	0.00	0.00	0.00	13.63
		Overs	21.39	0.00	0.00	0.00	0.00	0.00	0.00	0.00	21.39
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-76.20 + 50.80	-3 + 2	Feed	14.71	0.00	0.00	0.00	0.00	0.00	0.00	0.00	14.71
		Overs	23.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	23.10
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-50.80 + 25.40	-2 + 1	Feed	15.93	0.08	0.00	0.00	0.00	0.00	0.00	0.00	16.01
		Overs	25.01	0.12	0.00	0.00	0.00	0.00	0.00	0.00	25.13
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-25.40 + 31.75R	-1 + 1.25R	Feed	2.77	0.11	0.00	0.00	0.00	0.00	0.00	0.00	2.88
		Overs	3.35	0.18	0.00	0.00	0.00	0.00	0.00	0.00	3.53
		Unders	1.76	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.76
-31.75R + 12.70	-1.25R + 0.50	Feed	20.89	1.50	0.00	0.00	0.00	0.00	0.00	0.00	22.39
		Overs	18.37	1.73	0.00	0.00	0.00	0.00	0.00	0.00	20.10
		Unders	25.28	1.10	0.00	0.00	0.00	0.00	0.00	0.00	26.38
-12.70 + 9.53	-0.50 + 0.375	Feed	6.49	0.61	0.00	0.00	0.00	0.00	0.00	0.00	7.10
		Overs	2.66	0.21	0.00	0.00	0.00	0.00	0.00	0.00	2.87
		Unders	13.22	1.32	0.00	0.00	0.00	0.00	0.00	0.00	14.54
-9.53 + 5.14	-0.375 + 0.202	Feed	7.15	0.71	0.00	0.00	0.00	0.00	0.00	0.00	7.86
		Overs	1.48	0.69	0.00	0.00	0.00	0.00	0.00	0.00	2.17
		Unders	17.11	0.74	0.00	0.00	0.00	0.00	0.00	0.00	17.85
-5.14 + 2.74	-0.202 + 0.108	Feed	1.69	1.61	0.00	0.00	0.06	0.02	0.00	0.00	3.38
		Overs	0.00	0.38	0.00	0.00	0.00	0.00	0.00	0.00	0.38
		Unders	4.66	3.77	0.00	0.00	0.17	0.05	0.00	0.00	8.65
-2.74 + 1.30	-0.108 + 0.051	Feed	0.00	3.05	0.00	0.00	0.66	0.00	0.00	0.00	3.71
		Overs	0.00	0.36	0.00	0.00	0.00	0.00	0.00	0.00	0.36
		Unders	0.00	7.76	0.00	0.00	1.82	0.00	0.00	0.00	9.58
-1.30	-0.051	Feed	0.00	0.00	0.00	0.00	0.00	0.00	8.33	8.33	8.33
		Overs	0.00	0.00	0.00	0.00	0.00	0.00	0.97	0.97	0.97
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	21.24	21.24	21.24
Total	-	Feed	83.26	7.67	0.00	0.00	0.72	0.02	8.33	100.00	100.00
		Overs	95.36	3.67	0.00	0.00	0.00	0.00	0.97	100.00	100.00
		Unders	62.03	14.69	0.00	0.00	1.99	0.05	21.24	100.00	100.00

* R designates round sieve opening.

TABLE B-42. COMPONENT/SIZE DISTRIBUTION (12 rpm, feedrate = 9.90 Mg/h (10.89 tons/h), May 1981)
(% by weight)

	Size class*		Material	Paper & plastic	Organic other	Nonferrous	Ferrous	Glass	Inorganic other	Fines (-1.30 mm)	Total
	mm	in.									
+76.20	+3		Feed	1.01	0.00	0.00	0.00	0.00	0.00	0.00	1.01
			Overs	2.59	0.00	0.00	0.00	0.00	0.00	0.00	2.59
			Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-76.20 + 50.80	-3 + 2		Feed	6.68	0.00	0.00	0.00	0.00	0.00	0.00	6.68
			Overs	17.18	0.00	0.00	0.00	0.00	0.00	0.00	17.18
			Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-50.80 + 25.40	-2 + 1		Feed	12.55	0.05	0.00	0.00	0.00	0.00	0.00	12.60
			Overs	32.27	0.13	0.00	0.00	0.00	0.00	0.00	32.40
			Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-25.40 + 31.75R	-1 + 1.25R		Feed	2.03	0.00	0.00	0.00	0.00	0.00	0.00	2.03
			Overs	3.63	0.00	0.00	0.00	0.00	0.00	0.00	3.63
			Unders	1.01	0.00	0.00	0.00	0.00	0.00	0.00	1.01
-31.75R + 12.70	-1.25R + 0.50		Feed	15.58	0.48	0.16	0.00	0.00	0.00	0.00	16.22
			Overs	25.70	0.19	0.00	0.00	0.00	0.00	0.00	25.89
			Unders	9.14	0.66	0.26	0.00	0.00	0.00	0.00	10.06
-12.70 + 9.53	-0.50 + 0.375		Feed	7.33	0.62	0.00	0.00	0.00	0.00	0.00	7.95
			Overs	4.87	0.47	0.00	0.00	0.00	0.00	0.00	5.34
			Unders	8.90	0.71	0.00	0.00	0.00	0.00	0.00	9.61
-9.53 + 5.14	-0.375 + 0.202		Feed	13.81	0.99	0.00	0.00	0.00	0.00	0.00	14.80
			Overs	5.13	0.43	0.00	0.00	0.00	0.00	0.00	5.56
			Unders	19.33	1.35	0.00	0.00	0.00	0.00	0.00	20.68
-5.14 + 2.74	-0.202 + 0.108		Feed	3.66	5.12	0.00	0.00	0.09	0.00	0.00	8.87
			Overs	0.00	1.55	0.00	0.00	0.00	0.00	0.00	1.55
			Unders	5.99	7.40	0.00	0.00	0.15	0.00	0.00	13.54
-2.74 + 1.30	-0.108 + 0.051		Feed	0.00	8.41	0.00	0.00	1.40	0.06	0.00	9.87
			Overs	0.00	1.57	0.00	0.00	0.01	0.00	0.00	1.58
			Unders	0.00	12.77	0.00	0.00	2.28	0.10	0.00	15.15
-1.30	-0.051		Feed	0.00	0.00	0.00	0.00	0.00	0.00	19.97	19.97
			Overs	0.00	0.00	0.00	0.00	0.00	0.00	4.28	4.28
			Unders	0.00	0.00	0.00	0.00	0.00	0.00	29.95	29.95
Total	-		Feed	62.65	15.67	0.16	0.00	1.49	0.06	19.97	100.00
			Overs	91.37	4.34	0.00	0.00	0.01	0.00	4.28	100.00
			Unders	44.37	22.89	0.26	0.00	2.43	0.10	29.95	100.00

* R designates round sieve opening.

TABLE B-43. COMPONENT/SIZE DISTRIBUTION (12 rpm, feedrate = 10.59 Mg/h (11.65 tons/h), May 1981)
(% by weight)

mm	Size class ^a		Material	Paper & plastic	Organic other	Nonferrous	Ferrous	Glass	Inorganic other	Fines (-1.30 mm)	Total
	in.										
+76.20	+3		Feed	1.62	0.00	0.00	0.00	0.00	0.00	0.00	1.62
			Overs	2.90	0.00	0.00	0.00	0.00	0.00	0.00	2.90
			Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-76.20 + 50.80	-3 + 2		Feed	11.52	0.18	0.00	0.00	0.00	0.00	0.00	11.70
			Overs	20.57	0.32	0.00	0.00	0.00	0.00	0.00	20.89
			Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-50.80 + 25.40	-2 + 1		Feed	17.94	0.50	0.00	0.00	0.00	0.00	0.00	18.44
			Overs	32.03	0.89	0.00	0.00	0.00	0.00	0.00	32.92
			Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-25.40 + 31.75R	-1 + 1.25R		Feed	1.61	0.00	0.00	0.00	0.00	0.00	0.00	1.61
			Overs	2.66	0.00	0.00	0.00	0.00	0.00	0.00	2.66
			Unders	0.28	0.00	0.00	0.00	0.00	0.00	0.00	0.28
-31.75R + 12.70	-1.25R + 0.50		Feed	18.12	0.73	0.00	0.00	0.00	0.00	0.00	18.85
			Overs	23.42	0.53	0.00	0.00	0.00	0.00	0.00	23.95
			Unders	11.40	0.98	0.00	0.00	0.00	0.00	0.00	12.38
-12.70 + 9.53	-0.50 + 0.375		Feed	7.74	0.32	0.00	0.00	0.00	0.50	0.00	8.56
			Overs	5.03	0.21	0.00	0.00	0.00	0.00	0.00	5.24
			Unders	11.18	0.46	0.00	0.00	0.00	1.13	0.00	12.77
-9.53 + 5.14	-0.375 + 0.202		Feed	12.40	0.78	0.07	0.00	0.01	0.05	0.00	13.31
			Overs	5.12	0.35	0.00	0.00	0.02	0.00	0.00	5.49
			Unders	21.67	1.33	0.16	0.00	0.00	0.11	0.00	23.27
-5.14 + 2.74	-0.202 + 0.108		Feed	2.75	3.04	0.00	0.00	0.07	0.00	0.00	5.86
			Overs	0.00	1.57	0.00	0.00	0.00	0.00	0.00	1.57
			Unders	6.24	4.90	0.01	0.00	0.16	0.00	0.00	11.31
-2.74 + 1.30	-0.108 + 0.051		Feed	0.00	5.17	0.00	0.00	1.14	0.12	0.00	6.43
			Overs	0.00	1.23	0.00	0.00	0.00	0.00	0.00	1.23
			Unders	0.00	10.18	0.00	0.00	2.58	0.28	0.00	13.04
-1.30	-0.051		Feed	0.00	0.00	0.00	0.00	0.00	0.00	13.62	13.62
			Overs	0.00	0.00	0.00	0.00	0.00	0.00	3.15	3.15
			Unders	0.00	0.00	0.00	0.00	0.00	0.00	26.95	26.95
Total			Feed	73.70	10.72	0.07	0.00	1.22	0.67	13.62	100.00
			Overs	91.73	5.10	0.00	0.00	0.02	0.00	3.15	100.00
			Unders	50.77	17.85	0.17	0.00	2.74	1.52	26.95	100.00

* R designates round sieve opening.

TABLE B-44. COMPONENT/SIZE DISTRIBUTION (12 rpm, feedrate = 17.69 Mg/h (19.46 tons/h), May 1981)
(% by weight)

Size class*		Material	Paper & plastic	Organic other	Nonferrous	Ferrous	Glass	Inorganic other	Fines (-1.30 mm)	Total
mm	in.									
+76.20	+3	Feed	0.41	10.10	0.00	0.00	0.00	0.00	0.00	10.51
		Overs	0.68	16.59	0.00	0.00	0.00	0.00	0.00	17.27
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-76.20 + 50.80	-3 + 2	Feed	6.33	0.00	0.00	0.00	0.00	0.00	0.00	6.33
		Overs	10.40	0.00	0.00	0.00	0.00	0.00	0.00	10.40
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-50.80 + 25.40	-2 + 1	Feed	12.30	0.43	0.00	0.00	0.00	0.00	0.00	12.73
		Overs	20.19	0.71	0.00	0.00	0.00	0.00	0.00	20.90
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-25.40 + 31.75R	-1 + 1.25R	Feed	2.16	0.00	0.00	0.00	0.00	0.00	0.00	2.16
		Overs	3.00	0.00	0.00	0.00	0.00	0.00	0.00	3.00
		Unders	0.84	0.00	0.00	0.00	0.00	0.00	0.00	0.84
-31.75R + 12.70	-1.25R + 0.50	Feed	16.82	1.12	0.17	0.00	0.00	0.00	0.00	18.11
		Overs	20.84	1.57	0.00	0.00	0.00	0.00	0.00	22.41
		Unders	10.55	0.41	0.43	0.00	0.00	0.00	0.00	11.39
-12.70 + 9.53	-0.50 + 0.375	Feed	7.44	0.64	0.00	0.00	0.00	0.00	0.00	8.08
		Overs	5.89	0.65	0.00	0.00	0.00	0.00	0.00	6.54
		Unders	9.85	0.63	0.00	0.00	0.00	0.00	0.00	10.48
-9.53 + 5.14	-0.375 + 0.202	Feed	11.36	0.91	0.01	0.00	0.00	0.04	0.00	12.32
		Overs	7.17	0.61	0.01	0.00	0.00	0.01	0.00	7.80
		Unders	17.89	1.37	0.02	0.00	0.00	0.09	0.00	19.37
-5.14 + 2.74	-0.202 + 0.108	Feed	2.32	4.21	0.00	0.00	0.16	0.04	0.00	6.73
		Overs	0.00	2.73	0.00	0.00	0.03	0.00	0.00	2.76
		Unders	5.93	6.51	0.00	0.00	0.37	0.11	0.00	12.92
-2.74 + 1.30	-0.108 + 0.051	Feed	0.00	6.25	0.00	0.00	1.30	0.00	0.00	7.55
		Overs	0.00	2.70	0.00	0.00	0.26	0.00	0.00	2.96
		Unders	0.00	11.78	0.00	0.00	2.91	0.00	0.00	14.69
-1.30	-0.051	Feed	0.00	0.00	0.00	0.00	0.00	0.00	15.48	15.48
		Overs	0.00	0.00	0.00	0.00	0.00	0.00	5.96	5.96
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	30.31	30.31
Total	-	Feed	59.14	23.66	0.18	0.00	1.46	0.08	15.48	100.00
		Overs	68.17	25.56	0.01	0.00	0.29	0.01	5.96	100.00
		Unders	45.06	20.70	0.45	0.00	3.28	0.20	30.31	100.00

* R designates round sieve opening.

TABLE B-45. COMPONENT/SIZE DISTRIBUTION (12 rpm, 46.55 Mg/h (51.20 tons/h), May 1981)
(% by weight)

mm	Size class*	in.	Material	Paper & plastic	Organic other	Nonferrous	Ferrous	Glass	Inorganic other	Fines (-1.30 mm)	Total
+76.20	+3		Feed	7.71	0.00	0.00	0.00	0.00	0.00	0.00	7.71
			Overs	9.40	0.00	0.00	0.00	0.00	0.00	0.00	9.40
			Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-76.20 + 50.80	-3 + 2		Feed	9.21	0.00	0.00	0.00	0.00	0.00	0.00	9.21
			Overs	11.23	0.00	0.00	0.00	0.00	0.00	0.00	11.23
			Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-50.80 + 25.40	-2 + 1		Feed	11.71	0.00	0.00	0.00	0.00	0.00	0.00	11.71
			Overs	14.29	0.00	0.00	0.00	0.00	0.00	0.00	14.29
			Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-25.40 + 31.75R	-1 + 1.25R		Feed	1.77	0.00	0.00	0.00	0.00	0.00	0.00	1.77
			Overs	2.06	0.00	0.00	0.00	0.00	0.00	0.00	2.06
			Unders	0.45	0.00	0.00	0.00	0.00	0.00	0.00	0.45
-31.75R + 12.70	-1.25R + 0.50		Feed	17.37	0.39	0.00	0.00	0.00	0.00	0.00	17.76
			Overs	20.29	0.48	0.00	0.00	0.00	0.00	0.00	20.77
			Unders	4.08	0.00	0.00	0.00	0.00	0.00	0.00	4.08
-12.70 + 9.53	-0.50 + 0.175		Feed	8.81	0.06	0.00	0.00	0.00	0.00	0.00	8.87
			Overs	8.95	0.07	0.00	0.00	0.00	0.00	0.00	9.02
			Unders	8.19	0.02	0.00	0.00	0.00	0.00	0.00	8.21
-9.53 + 5.14	-0.375 + 0.202		Feed	15.10	0.18	0.10	0.00	0.50	0.01	0.00	15.89
			Overs	14.26	0.19	0.10	0.00	0.16	0.00	0.00	14.71
			Unders	18.97	0.12	0.00	0.00	2.03	0.05	0.00	21.17
-5.14 + 2.74	-0.202 + 0.108		Feed	4.60	0.28	0.00	0.00	2.25	0.22	0.00	7.35
			Overs	3.90	0.28	0.00	0.00	0.99	0.08	0.00	5.25
			Unders	7.81	0.26	0.00	0.00	7.99	0.88	0.00	16.94
-2.74 + 1.30	-0.108 + 0.051		Feed	1.08	1.55	0.00	0.01	4.57	0.12	0.00	7.33
			Overs	1.32	0.81	0.00	0.00	2.78	0.00	0.00	4.91
			Unders	0.00	4.92	0.00	0.03	12.72	0.66	0.00	18.33
-1.30	-0.051		Feed	0.00	0.00	0.00	0.00	0.00	0.00	12.40	12.40
			Overs	0.00	0.00	0.00	0.00	0.00	0.00	8.36	8.36
			Unders	0.00	0.00	0.00	0.00	0.00	0.00	30.82	30.82
Total	-		Feed	77.36	2.46	0.10	0.01	7.32	0.35	12.40	100.00
			Overs	85.70	1.83	0.10	0.00	3.93	0.08	8.36	100.00
			Unders	39.50	5.32	0.00	0.03	22.74	1.59	30.82	100.00

* R designates round sieve opening.

TABLE B-46. COMPONENT/SIZE DISTRIBUTION (6 rpm, feedrate = 2.64 Mg/h (2.90 tons/h), August 1981)
(% by weight)

Size class*		Material	Paper & plastic	Organic other	Nonferrous	Ferrous	Glass	Inorganic other	Fines (-1.30 mm)	Total
mm	in.									
+76.20	+3	Feed	3.11	0.16	0.00	0.00	0.00	0.00	0.00	3.27
		Overs	14.71	0.74	0.00	0.00	0.00	0.00	0.00	15.45
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-76.20 + 50.80	-3 + 2	Feed	4.44	0.53	0.43	0.00	0.00	0.00	0.00	5.40
		Overs	20.99	2.50	2.04	0.00	0.00	0.00	0.00	25.53
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-50.80 + 25.40	-2 + 1	Feed	8.35	0.30	0.09	0.00	0.00	0.00	0.00	8.74
		Overs	39.53	0.80	0.42	0.00	0.00	0.00	0.00	40.75
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-25.40 + 31.75R	-1 + 1.25R	Feed	0.24	0.01	0.00	0.00	0.00	0.00	0.00	0.25
		Overs	0.94	0.03	0.00	0.00	0.00	0.00	0.00	0.97
		Unders	0.05	0.17	0.00	0.00	0.00	0.00	0.00	0.22
-31.75R + 12.70	-1.25R + 0.50	Feed	10.06	0.64	0.06	0.02	0.00	0.00	0.00	10.78
		Overs	13.36	0.22	0.00	0.00	0.00	0.00	0.00	13.58
		Unders	9.17	0.76	0.08	0.03	0.00	0.00	0.00	10.04
-12.70 + 9.53	-0.50 + 0.375	Feed	7.98	0.38	0.00	0.00	0.00	0.00	0.00	8.36
		Overs	1.36	0.07	0.00	0.00	0.00	0.00	0.00	1.43
		Unders	9.76	0.46	0.00	0.00	0.00	0.00	0.00	10.22
-9.53 + 5.14	-0.375 + 0.202	Feed	14.01	1.32	0.04	0.00	0.04	0.06	0.00	15.47
		Overs	0.95	0.20	0.00	0.00	0.00	0.00	0.00	1.15
		Unders	17.51	1.62	0.04	0.00	0.05	0.08	0.00	19.30
-5.14 + 2.74	-0.202 + 0.108	Feed	7.27	5.10	0.00	0.00	0.45	0.14	0.00	12.96
		Overs	0.09	0.22	0.00	0.00	0.00	0.00	0.00	0.31
		Unders	9.20	6.41	0.00	0.00	0.57	0.18	0.00	16.36
-2.74 + 1.30	-0.108 + 0.051	Feed	6.32	3.15	0.00	0.00	3.44	0.20	0.00	13.11
		Overs	0.08	0.14	0.00	0.00	0.00	0.00	0.00	0.22
		Unders	7.99	3.96	0.00	0.00	4.36	0.25	0.00	16.56
-1.30	-0.051	Feed	0.00	0.00	0.00	0.00	0.00	0.00	21.66	21.66
		Overs	0.00	0.00	0.00	0.00	0.00	0.00	0.61	0.61
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	27.30	27.30
Total	-	Feed	61.78	11.59	0.62	0.02	3.93	0.40	21.66	100.00
		Overs	92.01	4.92	2.46	0.00	0.00	0.00	0.61	100.00
		Unders	53.68	13.38	0.12	0.03	4.98	0.51	27.30	100.00

* R designates round sieve opening.

TABLE B-47. COMPONENT/SIZE DISTRIBUTION (6 rpm, feedrate = 3.56 Mg/h (3.92 tons/h), August 1981)
(% by weight)

	Size class*		Material	Paper & plastic	Organic other	Nonferrous	Ferrous	Glass	Inorganic other	Fines (-1.30 mm)	Total
	mm	in.									
B-48	+76.20	+3	Feed	3.29	0.02	0.00	0.00	0.00	0.00	0.00	3.31
			Overs	11.59	0.09	0.00	0.00	0.00	0.00	0.00	11.68
			Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	-76.20 + 50.80	-3 + 2	Feed	9.10	0.07	0.55	0.00	0.00	0.00	0.00	9.72
			Overs	32.08	0.25	1.94	0.00	0.00	0.00	0.00	34.27
			Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	-50.80 + 25.40	-2 + 1	Feed	11.84	0.56	0.00	0.00	0.00	0.00	0.00	12.40
			Overs	41.42	1.95	0.00	0.00	0.00	0.00	0.00	43.37
			Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	-25.40 + 31.75R	-1 + 1.25R	Feed	0.16	0.04	0.00	0.00	0.00	0.00	0.00	0.20
			Overs	0.22	0.01	0.00	0.00	0.00	0.00	0.00	0.23
			Unders	0.26	0.06	0.00	0.00	0.00	0.00	0.00	0.32
	-31.75R + 12.70	-1.25R + 0.50	Feed	8.36	0.66	0.28	0.15	0.00	0.00	0.00	9.45
			Overs	7.00	0.35	0.24	0.00	0.00	0.00	0.00	7.59
			Unders	8.90	0.79	0.23	0.21	0.00	0.00	0.00	10.19
	-12.70 + 9.53	-0.50 + 0.375	Feed	5.69	0.61	0.04	0.00	0.00	0.00	0.00	6.34
			Overs	0.69	0.27	0.00	0.00	0.00	0.00	0.00	0.96
			Unders	7.67	0.74	0.05	0.00	0.00	0.00	0.00	8.46
	-9.53 + 5.14	-0.375 + 0.202	Feed	10.42	0.81	0.01	0.01	0.16	0.42	0.00	11.83
			Overs	0.55	0.16	0.00	0.00	0.00	0.00	0.00	0.71
			Unders	14.34	1.07	0.02	0.01	0.23	0.59	0.00	16.26
	-5.14 + 2.74	-0.202 + 0.108	Feed	4.80	3.70	0.00	0.00	1.59	0.41	0.00	10.50
			Overs	0.06	0.18	0.00	0.00	0.00	0.00	0.00	0.24
			Unders	6.67	5.09	0.00	0.00	2.22	0.58	0.00	14.56
	-2.74 + 1.30	-0.108 + 0.051	Feed	4.10	1.56	0.00	0.00	6.63	0.93	0.00	13.22
			Overs	0.05	0.11	0.00	0.00	0.00	0.00	0.00	0.16
			Unders	5.70	2.13	0.00	0.00	9.25	1.30	0.00	18.38
	-1.30	-0.051	Feed	0.00	0.00	0.00	0.00	0.00	0.00	23.03	23.03
			Overs	0.00	0.00	0.00	0.00	0.00	0.00	0.79	0.79
			Unders	0.00	0.00	0.00	0.00	0.00	0.00	31.83	31.83
	Total		Feed	51.76	8.03	0.88	0.16	8.38	1.76	23.03	100.00
			Overs	91.66	3.37	2.18	0.00	0.00	0.00	0.79	100.00
			Unders	43.54	9.88	0.36	0.22	11.70	2.47	31.83	100.00

* R designates round sieve opening.

TABLE B-48. COMPONENT/SIZE DISTRIBUTION (6 rpm, feedrate = 7.80 Mg/h (8.58 tons/h), August 1981)
(% by weight)

	Size class*		Material	Paper & plastic	Organic other	Nonferrous	Ferrous	Glass	Inorganic other	Fines (-1.30 mm)	Total
	mm	in.									
+76.20	+3		Feed	2.07	0.00	0.00	0.00	0.00	0.00	0.00	2.07
			Overs	6.51	0.00	0.00	0.00	0.00	0.00	0.00	6.51
			Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-76.20 + 50.80	-3 + 2		Feed	5.52	0.25	0.00	0.00	0.00	0.00	0.00	5.77
			Overs	17.30	0.78	0.00	0.00	0.00	0.00	0.00	18.08
			Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-50.80 + 25.40	-2 + 1		Feed	13.13	0.08	0.00	0.00	0.00	0.00	0.00	13.21
			Overs	37.33	0.26	0.00	0.00	0.00	0.00	0.00	37.59
			Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-25.40 + 31.75R	-1 + 1.25R		Feed	0.22	0.00	0.00	0.00	0.00	0.00	0.00	0.22
			Overs	0.69	0.00	0.00	0.00	0.00	0.00	0.00	0.69
			Unders	1.81	0.00	0.00	0.00	0.00	0.00	0.00	1.81
-31.75R + 12.70	-1.25R + 0.50		Feed	10.64	0.43	0.42	0.00	0.00	0.00	0.00	11.49
			Overs	15.72	0.43	0.84	0.00	0.00	0.00	0.00	16.99
			Unders	8.26	0.43	0.22	0.00	0.00	0.00	0.00	8.91
-12.70 + 9.53	-0.50 + 0.375		Feed	6.18	0.51	0.14	0.00	0.00	0.03	0.00	6.86
			Overs	3.52	0.13	0.00	0.00	0.00	0.00	0.00	3.65
			Unders	7.43	0.69	0.20	0.00	0.00	0.04	0.00	8.36
-9.53 + 5.14	-0.375 + 0.202		Feed	12.99	0.90	0.01	0.00	0.06	0.16	0.00	14.12
			Overs	4.94	0.36	0.01	0.00	0.00	0.05	0.00	5.36
			Unders	16.75	1.15	0.02	0.00	0.09	0.22	0.00	18.23
-5.14 + 2.74	-0.202 + 0.108		Feed	6.87	5.62	0.01	0.06	0.80	0.13	0.00	13.49
			Overs	1.33	1.59	0.00	0.00	0.03	0.02	0.00	2.97
			Unders	9.46	7.51	0.01	0.09	1.15	0.18	0.00	18.40
-2.74 + 1.30	-0.108 + 0.051		Feed	6.83	2.32	0.00	0.00	3.93	0.43	0.00	13.51
			Overs	1.47	0.64	0.00	0.00	0.29	0.16	0.00	2.56
			Unders	9.35	3.10	0.00	0.00	5.63	0.56	0.00	18.64
-1.30	-0.051		Feed	0.00	0.00	0.00	0.00	0.00	0.00	19.26	19.26
			Overs	0.00	0.00	0.00	0.00	0.00	0.00	5.60	5.60
			Unders	0.00	0.00	0.00	0.00	0.00	0.00	25.65	25.65
Total	-		Feed	64.45	10.11	0.58	0.06	4.79	0.75	19.26	100.00
			Overs	88.81	4.19	0.85	0.00	0.32	0.23	5.60	100.00
			Unders	53.06	12.88	0.45	0.09	6.87	1.00	25.65	100.00

* R designates round sieve opening.

TABLE E-49. COMPONENT/SIZE DISTRIBUTION (6 rpm, feedrate = 10.63 Mg/h (11.69 tons/h), August 1981)
(% by weight)

Size class*		Material	Paper & plastic	Organic other	Nonferrous	Ferrous	Glass	Inorganic other	Fines (-1.30 mm)	Total
mm	in.									
B-50	+76.20	+3	Feed	0.59	0.03	0.00	0.00	0.00	0.00	0.62
			Overs	1.40	0.07	0.00	0.00	0.00	0.00	1.47
			Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	-76.20 + 50.80	-3 + 2	Feed	7.04	0.38	0.42	0.00	0.00	0.00	7.84
			Overs	16.64	0.89	1.00	0.00	0.00	0.00	18.53
			Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	-50.80 + 25.40	-2 + 1	Feed	13.32	0.70	0.18	0.00	0.00	0.00	14.20
			Overs	31.51	1.64	0.43	0.00	0.00	0.00	33.58
			Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	-25.40 + 31.75R	-1 + 1.25R	Feed	0.68	0.07	0.00	0.05	0.00	0.00	0.80
			Overs	1.51	0.18	0.00	0.00	0.00	0.00	1.69
			Unders	0.07	0.00	0.00	0.00	0.00	0.00	0.07
	-31.75R + 12.70	-1.25R + 0.50	Feed	14.74	0.77	0.17	0.00	0.00	0.00	15.68
			Overs	20.81	1.12	0.16	0.11	0.00	0.00	22.20
			Unders	10.30	0.52	0.17	0.00	0.00	0.00	10.99
	-12.70 + 9.53	-0.50 + 0.375	Feed	5.56	0.36	0.03	0.00	0.00	0.00	5.95
			Overs	2.52	0.32	0.00	0.00	0.00	0.00	2.84
			Unders	7.78	0.38	0.06	0.00	0.00	0.00	8.22
	-9.53 + 5.14	-0.375 + 0.202	Feed	13.18	0.69	0.03	0.00	0.12	0.11	14.13
			Overs	4.62	0.58	0.00	0.00	0.00	0.07	5.27
			Unders	19.45	0.77	0.05	0.00	0.21	0.14	20.62
	-5.14 + 2.74	-0.202 + 0.108	Feed	6.85	3.54	0.00	0.00	0.70	0.20	11.29
			Overs	2.40	1.51	0.00	0.00	0.04	0.02	3.97
			Unders	10.12	5.02	0.00	0.00	1.19	0.33	16.66
	-2.74 + 1.30	-0.108 + 0.051	Feed	6.30	1.28	0.00	0.00	3.56	0.53	11.67
			Overs	2.29	0.93	0.00	0.00	0.44	0.06	3.72
			Unders	9.24	1.53	0.00	0.00	5.85	0.88	17.50
	-1.30	-0.051	Feed	0.00	0.00	0.00	0.00	0.00	17.82	17.82
			Overs	0.00	0.00	0.00	0.00	0.00	6.73	6.73
			Unders	0.00	0.00	0.00	0.00	0.00	25.94	25.94
Total			Feed	68.26	7.82	0.83	0.05	4.38	0.84	100.00
			Overs	83.70	7.26	1.59	0.11	0.48	0.15	100.00
			Unders	56.96	8.22	0.28	0.00	7.25	1.35	100.00

TABLE B-50. COMPONENT/SIZE DISTRIBUTION (6 rpm, feedrate = 23.26 Mg/h (25.59 tons/h), August 1981)
(% by weight)

	Size class*		Material	Paper & plastic	Organic other	Nonferrous	Ferrous	Glass	Inorganic other	Fines (-1.30 mm)	Total
	mm	in.									
+76.20	+3		Feed	6.69	0.00	0.00	0.00	0.00	0.00	0.00	6.69
			Overs	9.80	0.00	0.00	0.00	0.00	0.00	0.00	9.80
			Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-76.20 + 50.80	-3 + 2		Feed	6.52	0.05	0.54	0.00	0.00	0.00	0.00	7.11
			Overs	9.54	0.07	0.79	0.00	0.00	0.00	0.00	10.40
			Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-50.80 + 25.40	-2 + 1		Feed	12.63	2.47	0.00	0.00	0.00	0.00	0.00	15.10
			Overs	18.49	3.62	0.00	0.00	0.00	0.00	0.00	22.11
			Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-25.40 + 31.75R	-1 + 1.25R		Feed	0.72	0.05	0.00	0.00	0.00	0.00	0.00	0.77
			Overs	1.03	0.07	0.00	0.00	0.00	0.00	0.00	1.10
			Unders	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.04
-31.75R + 12.70	-1.25R + 0.50		Feed	10.90	0.85	0.03	0.00	0.00	0.00	0.00	11.78
			Overs	13.65	1.15	0.04	0.00	0.00	0.00	0.00	14.84
			Unders	4.98	0.22	0.00	0.00	0.00	0.00	0.00	5.20
-12.70 + 9.53	-0.50 + 0.375		Feed	4.16	0.49	0.03	0.00	0.00	0.00	0.00	4.68
			Overs	3.49	0.57	0.03	0.00	0.00	0.00	0.00	4.09
			Unders	5.63	0.32	0.03	0.00	0.00	0.00	0.00	5.98
-9.53 + 5.14	-0.375 + 0.202		Feed	9.85	0.81	0.03	0.00	0.20	0.14	0.00	11.03
			Overs	8.48	0.70	0.01	0.00	0.00	0.05	0.00	9.24
			Unders	12.80	1.06	0.07	0.00	0.63	0.33	0.00	14.89
-5.14 + 2.74	-0.202 + 0.108		Feed	5.93	3.66	0.00	0.00	1.55	0.21	0.00	11.35
			Overs	4.08	3.53	0.00	0.00	0.25	0.07	0.00	7.93
			Unders	9.92	3.92	0.00	0.00	4.34	0.53	0.00	18.71
-2.74 + 1.30	-0.108 + 0.051		Feed	5.47	1.87	0.00	0.00	3.96	0.45	0.00	11.75
			Overs	3.65	2.00	0.00	0.00	1.13	0.20	0.00	6.98
			Unders	9.38	1.59	0.00	0.00	10.06	0.98	0.00	22.01
-1.30	-0.051		Feed	0.00	0.00	0.00	0.00	0.00	0.00	19.74	19.74
			Overs	0.00	0.00	0.00	0.00	0.00	0.00	13.51	13.51
			Unders	0.00	0.00	0.00	0.00	0.00	0.00	33.17	33.17
Total	-		Feed	62.87	10.25	0.63	0.00	5.71	0.80	19.74	100.00
			Overs	72.21	11.71	0.87	0.00	1.38	0.32	13.51	100.00
			Unders	42.75	7.11	0.10	0.00	15.03	1.84	33.17	100.00

* R designates round sieve opening.

TABLE B-51. COMPONENT/SIZE DISTRIBUTION (9 rpm, feedrate = 1.47 Mg/h (1.62 tons/h), August 1981)
(% by weight)

Size class*	Material	Paper & plastic	Organic other	Nonferrous	Ferrous	Glass	Inorganic other	Fines (-1.30 mm)	Total
mm	in.								
+76.20	+3	Feed	3.65	0.00	0.00	0.00	0.00	0.00	3.65
		Overs	19.87	0.00	0.00	0.00	0.00	0.00	19.87
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-76.20 + 50.80	-3 + 2	Feed	5.90	0.00	0.31	0.00	0.00	0.00	6.21
		Overs	32.09	0.00	1.67	0.00	0.00	0.00	33.76
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-50.80 + 25.40	-2 + 1	Feed	6.59	0.03	0.00	0.00	0.00	0.00	6.62
		Overs	35.87	0.19	0.00	0.00	0.00	0.00	36.06
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-25.40 + 31.75R	-1 + 1.25R	Feed	0.35	0.00	0.00	0.00	0.00	0.00	0.35
		Overs	0.91	0.00	0.00	0.00	0.00	0.00	0.91
		Unders	0.22	0.00	0.00	0.00	0.00	0.00	0.22
-31.75R + 12.70	-1.25R + 0.50	Feed	10.20	0.62	0.14	0.00	0.00	0.00	10.96
		Overs	7.90	0.01	0.00	0.00	0.00	0.00	7.91
		Unders	10.72	0.76	0.17	0.00	0.00	0.00	11.65
-12.70 + 9.53	-0.50 + 0.375	Feed	8.30	0.29	0.00	0.00	0.00	0.00	8.59
		Overs	0.37	0.04	0.00	0.00	0.00	0.00	0.41
		Unders	10.09	0.34	0.00	0.00	0.00	0.00	10.43
-9.53 + 5.14	-0.375 + 0.202	Feed	14.98	1.33	0.02	0.00	0.04	0.00	16.42
		Overs	0.13	0.21	0.00	0.00	0.00	0.00	0.34
		Unders	18.33	1.59	0.03	0.00	0.04	0.00	20.06
-5.14 + 2.74	-0.202 + 0.108	Feed	5.99	6.50	0.01	0.00	0.28	0.00	12.78
		Overs	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		Unders	7.33	7.96	0.01	0.00	0.35	0.00	15.65
-2.74 + 1.30	-0.108 + 0.051	Feed	5.97	2.84	0.00	0.00	2.43	0.94	12.18
		Overs	0.10	0.09	0.00	0.00	0.00	0.00	0.19
		Unders	7.29	3.46	0.00	0.00	2.97	1.15	14.87
-1.30	-0.051	Feed	0.00	0.00	0.00	0.00	0.00	22.24	22.24
		Overs	0.00	0.00	0.00	0.00	0.00	0.55	0.55
		Unders	0.00	0.00	0.00	0.00	0.00	27.12	27.12
Total	-	Feed	61.93	11.61	0.48	0.00	2.75	0.99	100.00
		Overs	97.24	0.54	1.67	0.00	0.00	0.55	100.00
		Unders	53.98	14.11	0.21	0.00	3.36	1.22	100.00

* R designates round sieve opening.

TABLE B-52. COMPONENT/SIZE DISTRIBUTION (9 rpm, Feedrate = 6.91 Mg/h (7.60 tons/h), August 1981)
(% by weight)

Size class*		Material	Paper & plastic	Organic other	Nonferrous	Ferrous	Glass	Inorganic other	Fines (-1.30 mm)	Total
mm	in.									
+76.20	+3	Feed	1.36	0.00	0.00	0.00	0.00	0.00	0.00	1.36
		Overs	4.54	0.00	0.00	0.00	0.00	0.00	0.00	4.54
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-76.20 + 50.80	-3 + 2	Feed	5.57	1.26	0.00	0.00	0.00	0.00	0.00	6.83
		Overs	18.69	4.24	0.00	0.00	0.00	0.00	0.00	22.93
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-50.80 + 25.40	-2 + 1	Feed	9.16	1.07	0.15	0.00	0.00	0.00	0.00	10.38
		Overs	30.22	3.58	0.50	0.00	0.00	0.00	0.00	34.30
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-25.40 + 31.75R	-1 + 1.25R	Feed	0.63	0.03	0.00	0.00	0.00	0.00	0.00	0.66
		Overs	1.94	0.10	0.00	0.00	0.00	0.00	0.00	2.04
		Unders	0.28	0.00	0.00	0.00	0.00	0.00	0.00	0.28
-31.75R + 12.70	-1.25R + 0.50	Feed	12.21	1.13	0.16	0.00	0.00	0.00	0.00	13.50
		Overs	19.76	1.01	0.00	0.00	0.00	0.00	0.00	20.77
		Unders	9.01	1.18	0.22	0.00	0.00	0.00	0.00	10.41
-12.70 + 9.53	-0.50 + 0.375	Feed	8.59	0.21	0.10	0.00	0.17	0.00	0.00	9.07
		Overs	3.67	0.07	0.02	0.00	0.00	0.00	0.00	3.76
		Unders	10.69	0.26	0.13	0.00	0.24	0.00	0.00	11.32
-9.53 + 5.14	-0.375 + 0.202	Feed	15.25	0.32	0.08	0.00	0.22	0.12	0.00	15.99
		Overs	4.61	0.12	0.00	0.00	0.00	0.05	0.00	4.78
		Unders	19.76	0.41	0.12	0.00	0.32	0.15	0.00	20.76
-5.14 + 2.74	-0.202 + 0.108	Feed	8.17	1.99	0.02	0.00	0.50	0.14	0.00	10.82
		Overs	1.63	0.04	0.00	0.00	0.00	0.00	0.00	1.67
		Unders	10.94	2.81	0.03	0.00	0.71	0.20	0.00	14.69
-2.74 + 1.30	-0.108 + 0.051	Feed	5.35	1.26	0.00	0.00	4.55	0.68	0.00	11.84
		Overs	0.92	0.25	0.00	0.00	0.16	0.06	0.00	1.39
		Unders	7.24	1.69	0.00	0.00	6.42	0.95	0.00	16.30
-1.30	-0.051	Feed	0.00	0.00	0.00	0.00	0.00	0.00	19.55	19.55
		Overs	0.00	0.00	0.00	0.00	0.00	0.00	3.82	3.82
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	26.24	26.24
Total	-	Feed	66.29	7.27	0.51	0.00	5.44	0.94	19.55	100.00
		Overs	85.98	9.41	0.52	0.00	0.16	0.11	3.82	100.00
		Unders	57.92	6.35	0.50	0.00	7.69	1.30	26.24	100.00

* R designates round sieve opening.

TABLE B-53. COMPONENT/SIZE DISTRIBUTION (9 rpm, feedrate = 10.17 Mg/h (11.19 tons/h), August 1981)
(% by weight)

mm	Size class* in.	Material	Paper & plastic	Organic other	Nonferrous	Ferrous	Glass	Inorganic other	Fines (-1.30 mm)	Total
+76.20	+3	Feed	3.43	0.00	0.00	0.00	0.00	0.00	0.00	3.43
		Overs	10.65	0.00	0.00	0.00	0.00	0.00	0.00	10.65
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-76.20 + 50.80	-3 + 2	Feed	8.58	0.05	0.00	0.00	0.00	0.00	0.00	8.63
		Overs	26.62	0.15	0.00	0.00	0.00	0.00	0.00	26.77
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-50.80 + 25.40	-2 + 1	Feed	10.18	0.37	0.27	0.00	0.00	0.00	0.00	10.82
		Overs	31.60	1.15	0.84	0.00	0.00	0.00	0.00	33.59
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-25.40 + 31.75R	-1 + 1.25R	Feed	0.34	0.12	0.00	0.00	0.00	0.00	0.00	0.46
		Overs	0.89	0.19	0.00	0.00	0.00	0.00	0.00	1.08
		Unders	0.07	0.08	0.00	0.00	0.00	0.00	0.00	0.15
-31.75R + 12.70	-1.25R + 0.50	Feed	9.69	0.24	0.13	0.00	0.00	0.00	0.00	10.06
		Overs	14.97	0.51	0.00	0.00	0.00	0.00	0.00	15.48
		Unders	7.18	0.12	0.18	0.00	0.00	0.00	0.00	7.48
-12.70 + 9.53	-0.50 + 0.375	Feed	6.40	0.43	0.12	0.00	0.00	0.00	0.00	6.95
		Overs	2.58	0.51	0.00	0.00	0.00	0.00	0.00	3.09
		Unders	8.22	0.39	0.18	0.00	0.00	0.00	0.00	8.79
-9.53 + 5.14	-0.375 + 0.202	Feed	13.22	0.82	0.00	0.00	0.13	0.30	0.00	14.47
		Overs	3.59	0.32	0.00	0.00	0.00	0.06	0.00	3.97
		Unders	17.81	1.05	0.00	0.00	0.19	0.42	0.00	19.47
-5.14 + 2.74	-0.202 + 0.108	Feed	9.38	2.87	0.00	0.00	0.49	0.26	0.00	13.00
		Overs	0.92	0.77	0.00	0.00	0.01	0.03	0.00	1.73
		Unders	13.41	3.87	0.00	0.00	0.72	0.37	0.00	18.37
-2.74 + 1.30	-0.108 + 0.051	Feed	5.74	3.01	0.00	0.00	3.87	0.70	0.00	13.32
		Overs	0.61	0.42	0.00	0.00	0.21	0.01	0.00	1.25
		Unders	8.17	4.24	0.00	0.00	5.61	1.03	0.00	19.05
-1.30	-0.051	Feed	0.00	0.00	0.00	0.00	0.00	0.00	18.86	18.86
		Overs	0.00	0.00	0.00	0.00	0.00	0.00	2.39	2.39
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	26.69	26.69
Total	-	Feed	66.96	7.91	0.52	0.00	4.49	1.26	18.86	100.00
		Overs	92.43	4.02	0.84	0.00	0.22	0.10	2.39	100.00
		Unders	54.86	9.75	0.36	0.00	6.52	1.82	26.69	100.00

* R designates round sieve opening.

TABLE B-54. COMPONENT/SIZE DISTRIBUTION (9 rpm, Feedrate = 12.71 Mg/h (13.98 tons/h), August 1981)
(% by weight)

Size class*		Material	Paper & plastic	Organic other	Nonferrous	Ferrous	Glass	Inorganic other	Fines (-1.30 mm)	Total
mm	in.									
+76.20	+3	Feed	2.84	0.00	0.00	0.00	0.00	0.00	0.00	2.84
		Overs	5.70	0.00	0.00	0.00	0.00	0.00	0.00	5.70
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-76.20 + 50.80	-3 + 2	Feed	5.76	0.07	0.00	0.00	0.00	0.00	0.00	5.83
		Overs	11.55	0.15	0.00	0.00	0.00	0.00	0.00	11.70
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-50.80 + 25.40	-2 + 1	Feed	14.29	0.88	0.00	0.00	0.00	0.00	0.00	15.17
		Overs	28.55	1.76	0.00	0.00	0.00	0.00	0.00	30.31
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-25.40 + 31.75R	-1 + 1.25R	Feed	0.18	0.01	0.00	0.00	0.00	0.00	0.00	0.19
		Overs	0.36	0.03	0.00	0.00	0.00	0.00	0.00	0.39
		Unders	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.10
-31.75R + 12.70	-1.25R + 0.50	Feed	13.21	0.61	0.21	0.00	0.00	0.00	0.00	14.03
		Overs	19.05	0.91	0.06	0.00	0.00	0.00	0.00	20.02
		Unders	7.40	0.31	0.35	0.00	0.00	0.00	0.00	8.06
-12.70 + 9.53	-0.50 + 0.375	Feed	6.43	0.20	0.00	0.00	0.00	0.00	0.00	6.63
		Overs	4.80	0.07	0.00	0.00	0.00	0.00	0.00	4.87
		Unders	8.05	0.32	0.00	0.00	0.00	0.00	0.00	8.37
-9.53 + 5.14	-0.375 + 0.202	Feed	13.93	0.45	0.02	0.00	0.06	0.22	0.00	14.68
		Overs	9.92	0.52	0.00	0.00	0.00	0.09	0.00	10.53
		Unders	17.92	0.37	0.04	0.00	0.11	0.36	0.00	18.80
-5.14 + 2.74	-0.202 + 0.108	Feed	6.00	4.28	0.00	0.00	0.51	0.24	0.00	11.03
		Overs	3.48	1.69	0.00	0.00	0.04	0.03	0.00	5.24
		Unders	8.50	6.87	0.00	0.00	0.98	0.45	0.00	16.80
-2.74 + 1.30	-0.108 + 0.051	Feed	5.47	1.71	0.00	0.00	2.63	1.72	0.00	11.53
		Overs	2.36	0.99	0.00	0.00	0.62	0.01	0.00	3.98
		Unders	8.56	2.42	0.00	0.00	4.63	3.43	0.00	19.04
-1.30	-0.051	Feed	0.00	0.00	0.00	0.00	0.00	0.00	18.07	18.07
		Overs	0.00	0.00	0.00	0.00	0.00	0.00	7.26	7.26
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	28.83	28.83
Total	-	Feed	68.11	8.21	0.23	0.00	3.20	2.18	18.07	100.00
		Overs	85.77	6.12	0.06	0.00	0.66	0.13	7.26	100.00
		Unders	50.53	10.29	0.39	0.00	5.72	4.24	28.83	100.00

* R designates round sieve opening.

TABLE B-55. COMPONENT/SIZE DISTRIBUTION (9 rpm, feedrate = 33.28 Mg/h (36.61 tons/h), August 1981)
(% by weight)

Size class*		Material	Paper & plastic	Organic other	Nonferrous	Ferrous	Glass	Inorganic other	Fines (-1.30 mm)	total
mm	in.									
+76.20	+3	Feed	5.04	0.03	0.00	0.00	0.00	0.00	0.00	5.07
		Overs	6.89	0.04	0.00	0.00	0.00	0.00	0.00	6.93
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-76.20 + 50.80	-3 + 2	Feed	6.89	1.26	0.00	0.00	0.00	0.00	0.00	8.15
		Overs	9.42	1.72	0.00	0.00	0.00	0.00	0.00	11.14
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-50.80 + 25.40	-2 + 1	Feed	13.28	0.53	0.11	0.00	0.00	0.00	0.00	13.92
		Overs	18.17	0.73	0.15	0.00	0.00	0.00	0.00	19.05
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-25.40 + 31.75R	-1 + 1.25R	Feed	0.32	0.15	0.00	0.00	0.00	0.00	0.00	0.47
		Overs	0.43	0.20	0.00	0.00	0.00	0.00	0.00	0.63
		Unders	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.02
-31.75R + 12.70	-1.25R + 0.50	Feed	14.26	0.89	0.02	0.00	0.00	0.00	0.00	15.17
		Overs	17.39	1.08	0.00	0.00	0.00	0.00	0.00	18.47
		Unders	5.75	0.39	0.00	0.00	0.00	0.00	0.00	6.20
-12.70 + 9.53	-0.50 + 0.375	Feed	4.68	0.53	0.04	0.00	0.00	0.00	0.00	5.25
		Overs	4.06	0.61	0.06	0.00	0.00	0.00	0.00	4.73
		Unders	6.37	0.32	0.00	0.00	0.00	0.00	0.00	6.69
-9.53 + 5.14	-0.375 + 0.202	Feed	10.43	1.13	0.00	0.00	0.11	0.09	0.00	11.76
		Overs	8.83	1.40	0.01	0.00	0.05	0.06	0.00	10.35
		Unders	14.78	0.37	0.00	0.00	0.28	0.18	0.00	15.61
-5.14 + 2.74	-0.202 + 0.108	Feed	6.20	4.02	0.02	0.00	0.80	0.10	0.00	11.14
		Overs	5.02	3.42	0.03	0.00	0.27	0.06	0.00	8.80
		Unders	9.41	5.64	0.00	0.00	2.24	0.19	0.00	17.48
-2.74 + 1.30	-0.108 + 0.051	Feed	5.54	2.19	0.00	0.00	2.60	0.48	0.00	10.81
		Overs	4.04	1.79	0.00	0.00	1.24	0.40	0.00	7.47
		Unders	9.62	3.26	0.00	0.00	6.30	0.70	0.00	19.88
-1.30	-0.051	Feed	0.00	0.00	0.00	0.00	0.00	0.00	18.26	18.26
		Overs	0.00	0.00	0.00	0.00	0.00	0.00	12.43	12.43
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	34.12	34.12
Total	-	Feed	66.64	10.73	0.19	0.00	3.51	0.67	18.26	100.00
		Overs	74.25	10.99	0.25	0.00	1.56	0.52	12.43	100.00
		Unders	45.95	9.98	0.06	0.00	8.82	1.07	34.12	100.00

* R designates round sieve opening.

TABLE B-56. COMPONENT/SIZE DISTRIBUTION (12 rpm, feedrate = 2.41 Mg/h (2.65 tons/h), August 1981)
(% by weight)

Size class*		Material	Paper & plastic	Organic other	Nonferrous	Ferrous	Glass	Inorganic other	Fines (-1.30 mm)	Total
mm	in.									
+76.20	+3	Feed	2.00	0.00	0.00	0.00	0.00	0.00	0.00	2.00
		Overs	8.59	0.00	0.00	0.00	0.00	0.00	0.00	8.59
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-76.20 + 50.80	-3 + 2	Feed	6.20	0.33	0.65	0.00	0.00	0.00	0.00	7.18
		Overs	26.67	1.42	2.80	0.00	0.00	0.00	0.00	30.89
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-50.80 + 25.40	-2 + 1	Feed	9.94	1.86	0.31	0.00	0.00	0.00	0.00	12.10
		Overs	41.71	3.65	1.32	0.00	0.00	0.00	0.00	46.68
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-25.40 + 31.75R	-1 + 1.25R	Feed	0.58	0.28	0.00	0.00	0.00	0.00	0.00	0.86
		Overs	1.61	0.06	0.00	0.00	0.00	0.00	0.00	1.67
		Unders	0.58	1.67	0.00	0.00	0.00	0.00	0.00	2.25
-31.75R + 12.70	-1.25R + 0.50	Feed	12.72	3.44	0.54	0.00	0.00	0.00	0.00	16.69
		Overs	10.57	0.19	0.00	0.00	0.00	0.00	0.00	10.76
		Unders	13.37	4.42	0.70	0.00	0.00	0.00	0.00	18.49
-12.70 + 9.53	-0.50 + 0.375	Feed	7.01	1.01	0.00	0.00	0.00	0.00	0.00	8.01
		Overs	0.37	0.02	0.00	0.00	0.00	0.00	0.00	0.39
		Unders	9.01	1.30	0.00	0.00	0.00	0.00	0.00	10.32
-9.53 + 5.14	-0.375 + 0.202	Feed	12.58	1.97	0.12	0.00	0.06	0.14	0.00	14.87
		Overs	0.20	0.20	0.00	0.01	0.00	0.00	0.00	0.41
		Unders	16.34	2.50	0.16	0.00	0.08	0.18	0.00	19.26
-5.14 + 2.74	-0.202 + 0.108	Feed	7.11	4.03	0.00	0.00	0.34	0.26	0.00	11.74
		Overs	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.06
		Unders	9.24	5.25	0.00	0.00	0.44	0.33	0.00	15.27
-2.74 + 1.30	-0.108 + 0.051	Feed	5.16	1.98	0.00	0.00	2.96	0.87	0.00	10.98
		Overs	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.08
		Unders	6.70	2.58	0.00	0.00	3.85	1.14	0.00	14.27
-1.30	-0.051	Feed	0.00	0.00	0.00	0.00	0.00	0.00	15.57	15.57
		Overs	0.00	0.00	0.00	0.00	0.00	0.00	0.47	0.47
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	20.14	20.14
Total	-	Feed	63.29	14.90	1.61	0.00	3.36	1.27	15.57	100.00
		Overs	89.86	5.54	4.12	0.01	0.00	0.00	0.47	100.00
		Unders	55.24	17.74	0.86	0.00	4.37	1.65	20.14	100.00

* R designates round sieve opening.

TABLE B-57. COMPONENT/SIZE DISTRIBUTION (12 rpm, feedrate = 4.91 Mg/h (5.40 tons/h), August 1981)
(% by weight)

Size class ^a	Material	Paper & plastic	Organic other	Nonferrous	Ferrous	Glass	Inorganic other	Fines (-1.30 mm)	Total
mm	in.								
+76.20	+3	Feed	0.93	0.69	0.00	0.00	0.00	0.00	1.62
		Overs	3.76	2.76	0.00	0.00	0.00	0.00	6.52
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-76.20 + 50.80	-3 + 2	Feed	5.97	0.07	0.00	0.00	0.00	0.00	6.04
		Overs	24.00	0.30	0.00	0.00	0.00	0.00	24.30
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-50.80 + 25.40	-2 + 1	Feed	11.56	0.90	0.14	0.00	0.00	0.00	12.60
		Overs	45.51	3.54	0.58	0.00	0.00	0.00	49.63
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-25.40 + 31.75R	-1 + 1.25R	Feed	0.21	0.01	0.00	0.00	0.00	0.00	0.22
		Overs	0.77	0.05	0.00	0.00	0.00	0.00	0.82
		Unders	0.33	0.02	0.00	0.00	0.00	0.00	0.35
-31.75R + 12.70	-1.25R + 0.50	Feed	15.38	1.38	0.20	0.00	0.00	0.00	16.96
		Overs	14.16	0.53	0.00	0.00	0.00	0.00	14.69
		Unders	15.78	1.66	0.26	0.00	0.00	0.00	17.70
-12.70 + 9.53	-0.50 + 0.375	Feed	7.93	0.72	0.13	0.00	0.00	0.00	8.78
		Overs	1.02	0.06	0.00	0.00	0.00	0.00	1.08
		Unders	10.22	0.94	0.18	0.00	0.00	0.00	11.34
-9.53 + 5.14	-0.375 + 0.202	Feed	14.31	1.11	0.01	0.04	0.04	0.00	15.55
		Overs	1.01	0.19	0.00	0.00	0.00	0.00	1.20
		Unders	18.71	1.41	0.01	0.05	0.05	0.00	20.28
-5.14 + 2.74	-0.202 + 0.108	Feed	6.63	4.98	0.01	0.00	0.27	0.00	11.94
		Overs	0.15	0.16	0.00	0.00	0.00	0.00	0.31
		Unders	8.78	6.59	0.01	0.00	0.36	0.00	15.81
-2.74 + 1.30	-0.108 + 0.051	Feed	5.57	2.12	0.00	0.00	2.08	0.61	10.38
		Overs	0.15	0.11	0.00	0.00	0.00	0.00	0.26
		Unders	7.37	2.78	0.00	0.00	2.77	0.82	13.74
-1.30	-0.051	Feed	0.00	0.00	0.00	0.00	0.00	15.91	15.91
		Overs	0.00	0.00	0.00	0.00	0.00	1.19	1.19
		Unders	0.00	0.00	0.00	0.00	0.00	20.78	20.78
Total	-	Feed	68.49	11.98	0.49	0.04	2.39	15.91	100.00
		Overs	90.53	7.70	0.58	0.00	0.00	1.19	100.00
		Unders	61.19	13.40	0.46	0.05	3.18	20.78	100.00

* R designates round sieve opening.

TABLE B-58. COMPONENT/SIZE DISTRIBUTION (12 rpm, feedrate = 7.12 Mg/h (7.83 tons/h), August 1981)
(% by weight)

	Size class*		Material	Paper & plastic	Organic other	Nonferrous	Ferrous	Glass	Inorganic other	Fines (-1.30 mm)	Total
	mm	in.									
B-59	+76.20	+3	Feed	2.36	0.00	0.00	0.00	0.00	0.00	0.00	2.36
			Overs	7.93	0.00	0.00	0.00	0.00	0.00	0.00	7.93
			Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	-76.20 + 50.80	-3 + 2	Feed	7.92	0.10	0.22	0.05	0.00	0.00	0.00	8.29
			Overs	26.59	0.33	0.72	0.17	0.00	0.00	0.00	27.81
			Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	-50.80 + 25.40	-2 + 1	Feed	10.81	0.12	0.41	0.14	0.00	0.00	0.00	11.48
			Overs	35.80	0.39	1.36	0.49	0.00	0.00	0.00	38.04
			Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	-25.40 + 31.75R	-1 + 1.25R	Feed	0.96	0.02	0.00	0.00	0.00	0.00	0.00	0.98
			Overs	2.86	0.06	0.00	0.00	0.00	0.00	0.00	2.92
			Unders	0.38	0.00	0.00	0.00	0.00	0.00	0.00	0.38
	-31.75R + 12.70	-1.25R + 0.50	Feed	11.97	0.78	0.17	0.00	0.00	0.00	0.00	12.92
			Overs	14.53	0.42	0.12	0.00	0.00	0.00	0.00	15.07
			Unders	10.89	0.93	0.18	0.00	0.00	0.00	0.00	12.00
	-12.70 + 9.53	-0.50 + 0.375	Feed	6.74	0.25	0.14	0.00	0.00	0.00	0.00	7.13
			Overs	1.57	0.13	0.04	0.00	0.00	0.00	0.00	1.74
			Unders	8.94	0.30	0.18	0.00	0.00	0.00	0.00	9.42
	-9.53 + 5.14	-0.375 + 0.202	Feed	11.76	0.43	0.03	0.39	0.18	0.25	0.00	13.04
			Overs	2.24	0.36	0.00	0.00	0.00	0.00	0.00	2.60
			Unders	15.80	0.46	0.05	0.56	0.25	0.36	0.00	17.48
	-5.14 + 2.74	-0.202 + 0.108	Feed	8.26	2.25	0.00	0.00	1.31	1.33	0.00	13.15
			Overs	0.76	0.23	0.00	0.00	0.01	0.01	0.00	1.01
			Unders	11.45	3.11	0.00	0.00	1.86	1.88	0.00	18.30
	-2.74 + 1.30	-0.108 + 0.051	Feed	5.37	1.95	0.00	0.00	4.91	0.87	0.00	13.10
			Overs	0.41	0.41	0.00	0.00	0.04	0.57	0.00	1.43
			Unders	7.48	2.60	0.00	0.00	6.97	0.99	0.00	18.04
	-1.30	-0.051	Feed	0.00	0.00	0.00	0.00	0.00	0.00	17.55	17.55
			Overs	0.00	0.00	0.00	0.00	0.00	0.00	1.45	1.45
			Unders	0.00	0.00	0.00	0.00	0.00	0.00	24.38	24.38
	Total	-	Feed	66.15	5.90	0.97	0.58	6.40	2.45	17.55	100.00
			Overs	92.69	2.33	2.24	0.66	0.05	0.58	1.45	100.00
			Unders	54.94	7.40	0.41	0.56	9.08	3.23	24.38	100.00

* R designates round sieve opening.

TABLE B-55. COMPONENT/SIZE DISTRIBUTION (12 rpm, feedrate = 13.79 Mg/h (15.17 tons/h), August 1981)
(% by weight)

mm	Size class*	in.	Material	Paper & plastic	Organic other	Nonferrous	Ferrous	Glass	Inorganic other	Fines (-1.30 mm)	Total
+76.20	+3		Feed	1.75	0.00	0.00	0.00	0.00	0.00	0.00	1.75
			Overs	4.18	0.00	0.00	0.00	0.00	0.00	0.00	4.18
			Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-76.20 + 50.80	-3 + 2		Feed	8.03	0.10	0.00	0.00	0.00	0.00	0.00	8.13
			Overs	19.16	0.23	0.00	0.00	0.00	0.00	0.00	19.39
			Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-50.80 + 25.40	-2 + 1		Feed	16.59	0.35	0.08	0.00	0.00	0.00	0.00	17.02
			Overs	39.57	0.83	0.20	0.00	0.00	0.00	0.00	40.60
			Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-25.40 + 31.75R	-1 + 1.25R		Feed	0.25	0.12	0.00	0.00	0.00	0.00	0.00	0.37
			Overs	0.59	0.30	0.00	0.00	0.00	0.00	0.00	0.89
			Unders	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.01
-31.75R + 12.70	-1.25R + 0.50		Feed	10.49	0.82	0.00	0.00	0.00	0.00	0.00	11.31
			Overs	16.17	0.63	0.00	0.00	0.00	0.00	0.00	16.80
			Unders	6.39	0.95	0.00	0.00	0.00	0.00	0.00	7.34
-12.70 + 9.53	-0.50 + 0.375		Feed	5.73	0.28	0.00	0.00	0.00	0.10	0.00	6.11
			Overs	3.02	0.09	0.00	0.00	0.00	0.00	0.00	3.11
			Unders	7.69	0.42	0.00	0.00	0.00	0.18	0.00	8.29
-9.53 + 5.14	-0.375 + 0.202		Feed	12.70	0.68	0.04	0.00	0.12	0.12	0.00	13.66
			Overs	4.94	0.16	0.00	0.00	0.00	0.00	0.00	5.10
			Unders	18.30	1.06	0.06	0.00	0.21	0.21	0.00	19.84
-5.14 + 2.74	-0.202 + 0.108		Feed	5.98	4.01	0.00	0.00	1.21	0.42	0.00	11.62
			Overs	1.70	0.87	0.00	0.00	0.02	0.00	0.00	2.59
			Unders	9.06	6.27	0.00	0.00	2.06	0.71	0.00	18.10
-2.74 + 1.30	-0.108 + 0.051		Feed	5.80	2.16	0.00	0.00	2.91	1.00	0.00	11.87
			Overs	1.32	0.71	0.00	0.00	0.14	0.11	0.00	2.28
			Unders	9.04	3.21	0.00	0.00	4.91	1.64	0.00	18.80
-1.30	-0.051		Feed	0.00	0.00	0.00	0.00	0.00	0.00	18.16	18.16
			Overs	0.00	0.00	0.00	0.00	0.00	0.00	5.06	5.06
			Unders	0.00	0.00	0.00	0.00	0.00	0.00	27.62	27.62
Total	-		Feed	67.32	8.52	0.12	0.00	4.24	1.64	18.16	100.00
			Overs	90.65	3.82	0.20	0.00	0.16	0.11	5.06	100.00
			Unders	50.49	11.91	0.06	0.00	7.18	2.74	27.62	100.00

* R designates round sieve opening.

TABLE B-60. COMPONENT/SIZE DISTRIBUTION (12 rpm, feedrate = 32.06 Mg/h (35.27 tons/h), August 1981)
(% by weight)

Size class*		Material	Paper & plastic	Organic other	Nonferrous	Ferrous	Glass	Inorganic other	Fines (-1.30 mm)	Total
mm	in.									
+76.20	+3	Feed	1.62	0.04	0.00	0.00	0.00	0.00	0.00	1.66
		Overs	2.78	0.07	0.00	0.00	0.00	0.00	0.00	2.85
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-76.20 + 50.80	-3 + 2	Feed	6.70	1.62	0.00	0.00	0.00	0.00	0.00	8.32
		Overs	11.45	2.78	0.00	0.00	0.00	0.00	0.00	14.23
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-50.80 + 25.40	-2 + 1	Feed	12.30	1.68	0.00	0.00	0.00	0.00	0.00	13.98
		Overs	21.01	2.87	0.00	0.00	0.00	0.00	0.00	23.88
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-25.40 + 31.75R	-1 + 1.25R	Feed	0.79	0.08	0.00	0.00	0.00	0.00	0.00	0.87
		Overs	1.34	0.12	0.00	0.00	0.00	0.00	0.00	1.46
		Unders	0.03	0.02	0.00	0.00	0.00	0.00	0.00	0.05
-31.75R + 12.70	-1.25R + 0.50	Feed	13.33	3.32	0.14	0.11	0.00	0.00	0.00	16.90
		Overs	17.33	4.35	0.06	0.00	0.00	0.00	0.00	21.74
		Unders	7.70	1.87	0.25	0.27	0.00	0.00	0.00	10.09
-12.70 + 9.53	-0.50 + 0.375	Feed	4.70	0.32	0.05	0.02	0.00	0.02	0.00	5.11
		Overs	2.98	0.27	0.04	0.00	0.00	0.00	0.00	3.29
		Unders	7.12	0.39	0.05	0.04	0.00	0.05	0.00	7.65
-9.53 + 5.14	-0.375 + 0.202	Feed	10.58	1.03	0.05	0.07	0.28	0.14	0.00	12.15
		Overs	7.51	0.71	0.08	0.12	0.09	0.04	0.00	8.55
		Unders	14.90	1.48	0.00	0.00	0.54	0.29	0.00	17.21
-5.14 + 2.74	-0.202 + 0.108	Feed	6.87	3.15	0.00	0.00	1.31	0.43	0.00	11.76
		Overs	4.15	2.67	0.00	0.00	0.32	0.02	0.00	7.16
		Unders	10.70	3.83	0.00	0.00	2.72	1.01	0.00	18.26
-2.74 + 1.30	-0.108 + 0.051	Feed	6.08	1.60	0.00	0.00	2.75	0.57	0.00	11.00
		Overs	3.92	0.98	0.00	0.00	1.04	0.35	0.00	6.29
		Unders	9.13	2.46	0.00	0.00	5.16	0.88	0.00	17.64
-1.30	-0.051	Feed	0.00	0.00	0.00	0.00	0.00	0.00	18.25	18.25
		Overs	0.00	0.00	0.00	0.00	0.00	0.00	10.55	10.55
		Unders	0.00	0.00	0.00	0.00	0.00	0.00	29.10	29.10
Total	-	Feed	62.97	12.84	0.24	0.20	4.34	1.16	18.25	100.00
		Overs	72.47	14.82	0.18	0.12	1.45	0.41	10.55	100.00
		Unders	49.57	10.05	0.31	0.31	8.42	2.24	29.10	100.00

* R designates round sieve opening.

APPENDIX C

TROMMEL PERFORMANCE TEST DATA

TABLE C-1. LIST OF TEST RESULTS TABLES

Test period	Table title
October 1980	Trommel performance characterization - October 1980
October 1980	Properties of feed material - October 1980
October 1980	Properties of oversize fraction - October 1980
October 1980	Properties of undersize fraction - October 1980
January 1981	Trommel performance characterization - January 1981
January 1981	Properties of feed material - January 1981
January 1981	Properties of oversize fraction - January 1981
January 1981	Properties of undersize fraction - January 1981
May 1981	Trommel performance characterization - May 1981
May 1981	Properties of feed material - May 1981
May 1981	Properties of oversize fraction - May 1981
May 1981	Properties of undersize fraction - May 1981
August 1981	Trommel performance characterization - August 1981
August 1981	Properties of feed material - August 1981
August 1981	Properties of oversize fraction - August 1981
August 1981	Properties of undersize fraction - August 1981

TABLE C-2. TROMMEL PERFORMANCE CHARACTERIZATION - OCTOBER 1980

	Rotational speed				
	6 rpm				
Feedrate (Mg/h)	1.76	3.13	4.74	12.84	23.91
Screening efficiency (%)	90.3	92.8	90.8	69.5	32.3
Oversize split (%)	36.08	49.31	29.39	47.40	76.09
Undersize split (%)	63.92	50.69	70.61	52.60	23.91
Oversize flow rate (Mg/h)	0.64	1.55	1.39	6.09	18.18
Undersize flow rate (Mg/h)	1.12	1.58	3.35	6.75	5.73
True undersize in oversize fraction (%)	18.9	21.3	24.2	48.7	65.9
Heating value improvement (%)	132.8	122.1	123.7	134.6	101.5
Energy recovery (%)	47.9	60.2	36.4	63.8	77.3
Ash/energy content of oversize fraction (kg/GJ)	2.16	4.33	6.05	2.76	5.26
Organic quality improvement (%)	140.5	124.1	121.5	135.9	110.3
Organic recovery (%)	50.9	61.3	35.7	64.5	83.9
Ash content removal (%)	80.2	56.5	43.8	81.3	34.9
Moisture content removal (%)	41.6	30.5	44.3	8.9	0.3
Sample time (sec)	78	83	48	40	45
Leading edge residence time (sec)	85	89	105	80	68
Tracer residence time (sec)	45	41	66	63	51
Motor power requirement (kW)	5.37	2.31	3.51	4.30	5.31
Specific motor power requirements (kWh/Mg)	3.05	0.75	0.75	0.34	0.22

(continued)

TABLE C-2. (continued)

	Rotational speed				
	9 rpm				
Feedrate (Mg/h)	2.82	5.85	10.55	15.86	22.55
Screening efficiency (%)	81.0	92.3	55.2	62.2	55.3
Oversize split (%)	45.87	38.07	69.75	64.77	64.51
Undersize split (%)	54.13	61.93	30.25	35.23	35.49
Oversize flow rate (Mg/h)	1.29	2.23	7.36	10.27	14.55
Undersize flow rate (Mg/h)	1.53	3.62	3.19	5.59	8.00
True undersize in oversize fraction (%)	27.6	35.0	35.1	33.0	44.5
Heating value improvement (%)	120.1	124.9	122.9	120.7	117.0
Energy recovery (%)	55.1	47.5	85.7	78.2	75.5
Ash/energy content of oversize fraction (kg/GJ)	2.51	3.24	4.07	6.01	7.22
Organic quality improvement (%)	126.3	129.6	115.5	120.2	122.2
Organic recovery (%)	57.8	49.4	80.6	77.8	78.1
Ash content removal (%)	70.9	73.7	55.8	53.9	50.7
Moisture content removal (%)	33.3	30.4	10.3	4.5	5.8
Sample time (sec)	45	39	40	23	45
Leading edge residence time (sec)	63	70	65	75	66
Tracer residence time (sec)	36	31	41	47	48
Motor power requirement (kW)	4.10	4.47	4.33	4.86	6.52
Specific motor power requirements (kWh/Mg)	1.46	0.77	0.44	0.31	0.29

(continued)

TABLE C-2. (continued)

	Rotational speed				
	12 rpm				
Feedrate (Mg/h)	3.43	9.11	13.62	30.27	38.52
Screening efficiency (%)	92.6	68.2	75.5	50.1	43.7
Oversize split (%)	35.48	63.70	44.49	68.53	68.73
Undersize split (%)	64.52	36.30	55.51	31.47	31.27
Oversize flow rate (Mg/h)	1.22	5.80	6.06	20.74	26.47
Undersize flow rate (Mg/h)	2.21	3.31	7.56	9.53	12.05
True undersize in oversize fraction (%)	14.6	22.6	40.5	45.6	58.5
Heating value improvement (%)	143.2	124.5	117.1	113.7	110.0
Energy recovery (%)	50.8	79.3	52.1	77.9	76.3
Ash/energy content of oversize fraction (kg/GJ)	1.81	3.73	3.81	6.36	7.59
Organic quality improvement (%)	174.2	121.6	127.4	118.9	116.6
Organic recovery (%)	61.9	77.4	56.7	81.5	80.1
Ash content removal (%)	89.0	62.7	64.0	43.4	37.0
Moisture content removal (%)	18.3	10.7	6.9	6.3	2.6
Sample time (sec)	52	23	24	23	28
Leading edge residence time (sec)	58	54	89	62	62
Tracer residence time (sec)	26	43	28	50	40
Motor power requirement (kW)	4.42	4.23	-	5.23	6.71
Specific motor power requirements (kWh/Mg)	1.30	0.46	-	30.17	0.17

TABLE C-3. PROPERTIES OF FEED MATERIAL - OCTOBER 1980

	Rotational speed				
	6 rpm				
Feedrate (Mg/h)	1.76	3.13	4.74	12.84	23.91
Air-dry moisture content (%)	14.01	16.83	18.13	22.90	18.28
Oven-dry moisture content (%)	21.14	23.84	25.46	28.72	25.25
As-received ash content (%)	19.85	16.43	18.41	22.86	11.62
Oven-dry ash content (%)	25.17	21.57	24.70	32.07	15.54
As-received heating value (kJ/kg)	13,733	13,518	13,825	11,490	14,163
Oven-dry heating content (kJ/kg)	17,415	17,749	18,547	16,120	18,947
Ash/energy content (kg/GJ)	14.45	12.15	13.32	19.89	8.20
Organic content (%)	70.20	77.75	81.39	68.50	84.99
True oversize content (%)	29.3	38.8	22.3	24.3	26.0
Characteristic size (mm)	30.5	27.9	25.4	17.0	13.9
Nominal size (mm)	71.1	68.6	76.2	61.0	43.2
Component distribution					
Paper and plastic	67.18	72.66	72.64	65.02	79.63
Ferrous metal	0.00	0.00	0.26	0.00	0.21
Nonferrous metal	0.15	1.22	0.54	0.20	0.21
Glass	4.70	0.68	5.79	12.23	3.19
Organic other	3.02	5.09	8.74	3.49	5.37
Inorganic other	3.75	0.20	0.84	4.15	0.22
Fines (-1.30 mm)	21.20	20.15	11.18	14.91	11.17

(continued)

TABLE C-3. (continued)

	Rotational speed				
	9 rpm				
Feedrate (Mg/h)	2.82	5.85	10.55	15.86	22.55
Air-dry moisture content (%)	13.39	15.03	18.69	19.63	14.56
Oven-dry moisture content (%)	20.53	21.79	25.14	26.03	21.12
As-received ash content (%)	15.45	21.37	15.79	19.25	22.24
Oven-dry ash content (%)	19.44	27.33	21.09	26.03	28.19
As-received heating value (kJ/kg)	14,886	13,942	13,940	12,223	12,980
Oven-dry heating content (kJ/kg)	18,732	17,827	18,622	16,524	16,456
Ash/energy content (kg/GJ)	10.38	15.33	11.33	15.75	17.13
Organic content (%)	78.15	75.72	83.09	78.11	76.22
True oversize content (%)	33.2	24.8	45.2	43.4	35.8
Characteristic size (mm)	19.9	23.4	19.4	20.7	16.5
Nominal size (mm)	73.7	63.5	76.2	66.0	66.0
Component distribution					
Paper and plastic	73.48	70.78	78.02	74.23	73.38
Ferrous metal	0.07	0.13	0.00	0.13	0.00
Nonferrous metal	0.11	0.01	0.04	0.06	0.03
Glass	3.87	10.82	3.39	5.93	9.94
Organic other	4.67	4.93	5.06	3.88	2.83
Inorganic other	0.55	2.71	0.77	2.68	0.35
Fines (-1.30 mm)	17.25	10.62	12.72	13.09	13.47

(continued)

TABLE C-3. (continued)

	Rotational speed				
	12 rpm				
Feedrate (Mg/h)	3.43	9.11	13.62	30.27	38.52
Air-dry moisture content (%)	18.69	19.67	21.65	24.30	27.14
Oven-dry moisture content (%)	23.48	25.90	28.15	30.12	33.11
As-received ash content (%)	31.60	15.62	16.26	16.72	15.93
Oven-dry ash content (%)	41.29	21.08	22.63	23.92	23.82
As-received heating value (kJ/kg)	13,458	12,524	13,124	13,098	11,912
Oven-dry heating content (kJ/kg)	17,587	16,902	18,266	18,743	17,809
Ash/energy content (kg/GJ)	23.48	12.47	12.39	12.76	13.28
Organic content (%)	56.77	80.57	76.27	76.90	78.17
True oversize content (%)	30.3	49.3	18.0	37.3	28.5
Characteristic size (mm)	33.0	23.8	18.6	16.6	14.4
Nominal size (mm)	81.3	68.6	53.3	63.5	48.3
Component distribution					
Paper and plastic	53.50	78.49	72.31	73.70	71.71
Ferrous metal	0.00	0.00	0.67	0.26	0.00
Nonferrous metal	0.03	0.03	0.07	0.21	0.60
Glass	17.66	4.92	3.67	3.78	3.40
Organic other	3.27	2.08	3.95	3.20	6.46
Inorganic other	7.80	1.35	0.85	0.32	0.37
Fines (-1.30 mm)	17.74	13.13	18.48	18.53	17.46

TABLE C-4. PROPERTIES OF OVERSIZE FRACTION - OCTOBER 1980

	Rotational speed				
	6 rpm				
Feedrate (Mg/h)	1.76	3.13	4.74	12.84	23.91
Air-dry moisture content (%)	2.91	8.43	6.87	19.42	18.26
Oven-dry moisture content (%)	12.35	16.56	14.19	26.17	25.18
As-received ash content (%)	3.94	7.15	10.35	4.27	7.56
Oven-dry ash content (%)	4.50	8.57	12.06	5.78	10.10
As-received heating value (kJ/kg)	18,240	16,500	17,104	15,469	14,380
Oven-dry heating content (kJ/kg)	20,810	19.775	19,932	20,952	19,219
Ash/energy content (kg/GJ)	2.16	4.33	6.05	2.76	5.26
Organic content (%)	98.59	96.45	98.88	93.12	93.72
Characteristic size (mm)	58.42	53.34	56.39	38.10	22.86
Nominal size (mm)	78.74	83.82	88.90	76.20	76.20
Bulk density (kg/m ³)	27.23	35.24	26.63	65.67	67.28
Component distribution					
Paper and plastic	96.63	93.50	98.89	88.75	87.59
Ferrous metal	0.00	0.00	0.00	0.00	0.00
Nonferrous metal	0.00	2.04	0.00	0.00	0.19
Glass	0.00	0.00	0.03	0.32	1.94
Organic other	1.96	2.95	5.00	4.38	6.14
Inorganic other	0.00	0.00	0.03	0.14	0.10
Fines (-1.30 mm)	1.41	1.51	1.05	6.41	4.04

(continued)

TABLE C-4. (continued)

	Rotational speed				
	9 rpm				
Feedrate (Mg/h)	2.82	5.85	10.55	15.86	22.55
Air-dry moisture content (%)	5.50	7.42	15.08	17.49	12.11
Oven-dry moisture content (%)	13.69	15.16	22.56	24.89	19.90
As-received ash content (%)	4.50	5.63	6.98	8.87	10.97
Oven-dry ash content (%)	5.21	6.64	9.01	11.80	13.70
As-received heating value (kJ/kg)	17,883	17,411	17,132	14,749	15,190
Oven-dry heating content (kJ/kg)	20,719	20,522	22,123	19,631	18,964
Ash/energy content (kg/GJ)	2.51	3.24	4.07	6.01	7.22
Organic content (%)	98.68	98.11	95.94	93.86	93.10
Characteristic size (mm)	56.39	48.26	56.39	53.34	43.18
Nominal size (mm)	86.36	73.66	88.90	73.66	81.28
Bulk density (kg/m ³)	32.04	25.63	43.25	49.66	57.66
Component distribution					
Paper and plastic	96.91	95.99	92.21	91.24	90.24
Ferrous metal	0.00	0.00	0.00	0.00	0.00
Nonferrous metal	0.00	0.00	0.02	0.02	0.02
Glass	0.02	0.04	0.12	0.81	0.81
Organic other	1.76	2.12	3.74	2.86	2.86
Inorganic other	0.04	0.00	0.10	0.04	0.04
Fines (-1.30 mm)	1.27	1.85	3.81	6.03	6.03

(continued)

TABLE C-4. (continued)

	Rotational speed				
	12 rpm				
Feedrate (Mg/h)	3.43	9.11	13.62	30.27	38.52
Air-dry moisture content (%)	12.52	16.27	19.00	22.01	25.69
Oven-dry moisture content (%)	19.18	23.14	26.21	28.22	32.29
As-received ash content (%)	3.49	5.82	5.85	9.47	10.04
Oven-dry ash content (%)	4.32	7.57	7.93	13.20	14.82
As-received heating value (kJ/kg)	19,273	15,590	15,373	14,889	13,228
Oven-dry heating content (kJ/kg)	23,847	20,284	20,834	20,743	19,527
Ash/energy content (kg/GJ)	1.81	3.73	3.81	6.36	7.59
Organic content (%)	98.88	97.99	97.19	91.41	91.12
Characteristic size (mm)	66.04	50.80	38.10	40.64	25.40
Nominal size (mm)	91.44	82.82	68.58	81.28	66.04
Bulk density (kg/m ³)	33.64	51.26	46.45	60.87	60.87
Component distribution					
Paper and plastic	97.53	96.84	93.54	88.52	83.73
Ferrous metal	0.00	0.00	0.00	0.38	0.00
Nonferrous metal	0.00	0.00	0.00	0.09	0.83
Glass	0.01	0.08	0.06	0.34	0.59
Organic other	1.37	1.16	3.66	2.89	7.39
Inorganic other	0.05	0.09	0.07	0.07	0.10
Fines (-1.30 mm)	1.04	1.83	2.67	7.71	7.36

TABLE C-5. PROPERTIES OF UNDERSIZE FRACTION - OCTOBER 1980

	Rotational speed				
	6 rpm				
Feedrate (Mg/h)	1.76	3.13	4.74	12.84	23.91
Air-dry moisture content (%)	20.28	25.00	22.81	26.04	18.33
Oven-dry moisture content (%)	26.14	30.93	30.14	31.02	25.44
As-received ash content (%)	28.82	25.45	21.77	39.62	24.52
Oven-dry ash content (%)	39.02	36.84	31.16	57.44	32.89
As-received heating value (kJ/kg)	11,447	12,259	12,554	8,116	13,484
Oven-dry heating content (kJ/kg)	15,498	15,778	17,970	11,766	18,083
Ash/energy content (kg/GJ)	25.18	20.76	17.34	48.84	18.19
Organic content (%)	54.04	59.47	74.11	46.30	57.27
Characteristic size (mm)	8.64	7.62	8.64	10.16	7.11
Nominal size (mm)	14.99	13.21	15.49	16.76	11.94
Bulk density (kg/m ³)	174.4	148.8	169.6	232.0	161.6
Component distribution					
Paper and plastic	50.43	52.28	63.82	43.61	54.43
Ferrous metal	0.00	0.00	0.37	0.00	0.89
Nonferrous metal	0.24	0.42	0.77	0.38	0.29
Glass	7.37	1.34	8.19	22.98	7.13
Organic other	3.61	7.19	10.29	2.69	2.94
Inorganic other	5.88	0.41	1.17	7.77	0.61
Fines (-1.30 mm)	32.47	38.36	15.39	22.57	33.81

(continued)

TABLE C-5. (continued)

	Rotational speed				
	9 rpm				
Feedrate (Mg/h)	2.82	5.85	10.55	15.86	22.55
Air-dry moisture content (%)	20.08	19.71	27.03	23.56	19.00
Oven-dry moisture content (%)	26.31	25.86	31.10	28.15	23.33
As-received ash content (%)	24.73	31.06	26.11	38.36	42.71
Oven-dry ash content (%)	33.56	41.89	52.41	43.39	55.71
As-received heating value (kJ/kg)	15,268	11,988	7,268	7,768	9,124
Oven-dry heating content (kJ/kg)	17,048	16,170	10,548	10,812	11,901
Ash/energy content (kg/GJ)	19.69	25.91	49.69	49.38	46.81
Organic content (%)	60.80	61.95	53.42	49.17	46.26
Characteristic size (mm)	7.37	9.65	5.59	6.60	7.62
Nominal size (mm)	14.99	18.03	12.95	12.7	11.94
Bulk density (kg/m ³)	99.2	179.2	193.6	185.6	244.8
Component distribution					
Paper and plastic	53.67	55.28	45.34	41.74	43.47
Ferrous metal	0.12	0.20	0.00	0.38	0.00
Nonferrous metal	0.20	0.01	0.07	0.16	0.06
Glass	7.13	17.44	10.91	16.38	26.13
Organic other	7.13	6.67	8.08	7.43	2.79
Inorganic other	0.98	4.38	2.30	7.48	0.88
Fines (-1.30 mm)	30.77	16.02	33.30	26.43	26.67

(continued)

TABLE C-5. (continued)

	Rotational speed				
	12 rpm				
Feedrate (Mg/h)	3.43	9.11	13.62	30.27	38.52
Air-dry moisture content (%)	22.09	25.63	23.77	29.30	30.32
Oven-dry moisture content (%)	25.85	30.74	29.70	34.28	34.99
As-received ash content (%)	47.05	32.82	24.60	32.47	28.88
Oven-dry ash content (%)	63.45	47.38	34.99	49.41	44.42
As-received heating value (kJ/kg)	10,488	10,330	11,394	9,455	9,122
Oven-dry heating content (kJ/kg)	14,144	14,915	16,208	14,387	14,032
Ash/energy content (kg/GJ)	44.86	31.77	21.59	34.34	31.66
Organic content (%)	33.56	50.04	59.49	45.34	49.70
Characteristic size (mm)	10.16	9.14	8.18	6.10	6.10
Nominal size (mm)	20.83	17.78	13.97	12.95	12.45
Bulk density (kg/m ³)	195.2	150.4	190.4	204.8	204.8
Component distribution					
Paper and plastic	29.24	46.34	55.30	41.49	45.28
Ferrous metal	0.00	0.00	1.20	0.00	0.00
Nonferrous metal	0.04	0.07	0.13	0.46	0.10
Glass	27.50	13.40	6.56	11.27	9.59
Organic other	4.32	3.70	4.19	3.85	4.42
Inorganic other	12.08	3.57	1.47	0.87	0.96
Fines (-1.30 mm)	26.82	32.92	31.15	42.06	39.65

TABLE C-6. TROMMEL PERFORMANCE CHARACTERIZATION - JANUARY 1981

	Rotational speed				
	6 rpm				
Feedrate (Mg/h)	0.96	2.97	5.58	9.62	12.57
Screening efficiency (%)	89.5	81.4	54.6	46.01	49.1
Oversize split (%)	36.08	52.30	69.82	76.77	72.70
Undersize split (%)	63.92	47.70	30.18	23.23	27.30
Oversize flow rate (Mg/h)	0.35	1.56	3.89	7.39	9.15
Undersize flow rate (Mg/h)	0.61	1.41	1.69	2.23	3.42
True undersize in oversize fraction (%)	20.75	20.89	35.99	35.50	38.99
Organic quality improvement (%)	119.7	126.9	114.7	114.2	118.8
Organic recovery (%)	43.2	66.4	80.1	87.7	86.3
Ash content removal (%)	63.1	74.1	42.5	34.8	44.0
Moisture content removal (%)	21.5	35.5	9.0	3.4	1.7
Sample time (sec)	107	91	72	57.5	63
Leading edge residence time (sec)	-	103	108	-	91
Tracer residence time (sec)	40	64	66	52	57
Motor power requirement (kW)	3.6	3.7	4.8	4.1	3.7
Specific motor power requirements (kWh/Mg)	3.75	1.25	0.86	0.43	0.29

(continued)

TABLE C-6. (continued)

	Rotational speed				
	9 rpm				
Feedrate (Mg/h)	1.97	2.55	7.23	10.49	17.01
Screening efficiency (%)	68.4	75.1	84.2	63.8	58.0
Oversize split (%)	63.07	73.66	48.82	74.65	63.55
Undersize split (%)	36.93	26.34	51.18	25.35	36.45
Oversize flow rate (Mg/h)	1.24	1.88	3.53	7.83	10.82
Undersize flow rate (Mg/h)	0.73	0.67	3.70	2.66	6.19
True undersize in oversize fraction (%)	24.12	11.87	19.61	19.24	41.51
Organic quality improvement (%)	106.5	116.5	129.9	114.3	112.6
Organic recovery (%)	67.2	85.8	63.4	85.3	71.6
Ash content removal (%)	45.6	60.1	46.7	58.7	57.1
Moisture content removal (%)	2.9	7.5	48.9	12.8	4.8
Sample time (sec)	61	92	58	76	45
Leading edge residence time (sec)	90	75	85	77	93
Tracer residence time (sec)	42	31	32	51	44
Motor power requirement (kW)	3.8	3.6	3.9	4.1	4.0
Specific motor power requirements (kWh/Mg)	1.93	1.41	0.54	0.39	0.24

(continued)

TABLE C-6. (continued)

	Rotational speed				
	12 rpm				
Feedrate (Mg/h)	3.62	6.09	6.69	7.42	17.64
Screening efficiency (%)	83.3	86.7	73.9	79.4	59.3
Oversize split (%)	62.31	47.98	57.89	51.39	55.40
Undersize split (%)	37.69	52.02	42.11	48.61	44.60
Oversize flow rate (Mg/h)	2.26	2.92	3.87	3.81	9.77
Undersize flow rate (Mg/h)	1.36	3.17	2.82	3.61	7.87
True undersize in oversize fraction (%)	12.10	16.67	25.70	24.50	55.31
Organic quality improvement (%)	125.0	127.6	116.7	130.5	121.7
Organic recovery (%)	77.9	61.2	67.5	67.1	67.4
Ash content removal (%)	65.2	55.6	53.5	69.2	59.1
Moisture content removal (%)	26.1	24.1	25.9	17.9	7.4
Sample time (sec)	40	38	40.5	70	34
Leading edge residence time (sec)	58	61	73	59	64
Tracer residence time (sec)	26	32	32	28	32
Motor power requirement (kW)	3.5	3.6	3.8	3.9	5.8
Specific motor power requirements (kWh/Mg)	0.97	0.51	0.57	0.53	0.33

TABLE C-7. PROPERTIES OF FEED MATERIAL - JANUARY 1981

	Rotational speed				
	6 rpm				
Feedrate (Mg/h)	0.96	2.97	5.58	9.62	12.57
Air-dry moisture content (%)	18.91	13.49	15.87	14.59	18.04
Oven-dry moisture content (%)	24.71	19.80	22.19	20.28	23.93
As-received ash content (%)	14.55	19.47	13.87	22.02	21.63
Oven-dry ash content (%)	19.33	24.28	17.83	27.62	28.43
Organic content (%)	83.13	77.81	83.43	81.08	75.76
True oversize content (%)	28.72	41.37	44.69	49.52	44.37
Characteristic size (mm)	17.8	35.8	37.7	50.6	36.9
Nominal size (mm)	60.6	85.2	72.2	75.1	74.2
Component distribution (%)					
Paper and plastic	79.05	76.20	73.80	76.15	68.92
Ferrous metal	0.00	0.03	0.00	0.00	0.00
Nonferrous metal	0.04	0.46	1.04	0.00	0.03
Glass	1.95	7.54	4.53	6.21	4.17
Organic other	4.08	1.61	9.63	4.93	6.84
Inorganic other	0.00	0.61	0.47	0.73	1.64
Fines (-1.30 mm)	14.88	13.55	10.52	11.98	18.40

(continued)

TABLE C-7. (continued)

	Rotational speed				
	9 rpm				
Feedrate (Mg/h)	1.97	2.55	7.23	10.49	17.01
Air-dry moisture content (%)	0.00	14.74	13.66	19.97	24.49
Oven-dry moisture content (%)	7.21	20.91	18.88	24.79	29.71
As-received ash content (%)	11.68	17.42	27.49	15.55	15.54
Oven-dry ash content (%)	12.59	22.03	33.89	20.67	22.11
Organic content (%)	93.58	83.93	74.96	84.78	83.39
True oversize content (%)	47.86	64.92	39.24	60.28	37.17
Characteristic size (mm)	85.7	95.0	27.4	56.0	24.1
Nominal size (mm)	73.1	92.7	81.7	88.9	86.0
Component distribution (%)					
Paper and plastic	91.37	78.14	69.94	81.28	79.20
Ferrous metal	0.00	0.01	0.03	0.00	0.00
Nonferrous metal	0.29	0.60	0.86	0.33	0.11
Glass	0.68	5.93	6.07	5.63	3.95
Organic other	2.21	5.79	5.02	3.50	4.19
Inorganic other	0.26	0.60	0.67	0.78	0.61
Fines (-1.30 mm)	5.19	8.93	17.41	8.48	11.94

(continued)

TABLE C-7. (continued)

	Rotational speed				
	12 rpm				
Feedrate (Mg/h)	3.62	6.09	6.69	7.42	17.64
Air-dry moisture content (%)	14.03	13.39	16.51	21.12	19.84
Oven-dry moisture content (%)	19.54	18.70	22.94	25.92	25.76
As-received ash content (%)	19.83	26.05	13.08	22.72	20.51
Oven-dry ash content (%)	24.65	32.04	16.97	30.67	27.63
Organic content (%)	79.50	74.44	83.91	75.49	76.52
True oversize content (%)	54.77	42.38	43.01	38.80	24.76
Characteristic size (mm)	54.8	28.6	32.0	26.6	16.1
Nominal size (mm)	85.5	69.7	75.6	69.9	63.1
Component distribution (%)					
Paper and plastic	75.70	64.05	78.48	69.81	71.47
Ferrous metal	0.00	0.04	0.00	0.00	0.00
Nonferrous metal	0.08	2.20	0.45	0.06	0.52
Glass	5.36	4.69	3.16	8.16	8.22
Organic other	3.81	10.39	5.43	5.68	5.05
Inorganic other	0.82	1.64	0.00	0.00	0.15
Fines (-1.30 mm)	14.23	16.99	12.48	16.29	14.59

TABLE C-8. PROPERTIES OF OVERSIZE FRACTION - JANUARY 1981

	Rotational speed				
	6 rpm				
Feedrate (Mg/h)	0.96	2.97	5.58	9.62	12.57
Air-dry moisture content (%)	13.04	4.55	13.33	13.33	17.07
Oven-dry moisture content (%)	19.41	12.78	20.19	19.60	23.53
As-received ash content (%)	5.37	5.04	7.97	14.35	12.11
Oven-dry ash content (%)	6.66	5.78	9.99	17.85	15.84
Organic content (%)	99.49	98.73	95.71	92.58	89.97
Characteristic size (mm)	53.6	70.5	55.7	58.5	54.0
Nominal size (mm)	73.9	93.0	75.4	95.5	98.2
Bulk density (kg/m ³)	32.04	28.84	39.41	43.89	47.26
Component distribution					
Paper and plastic	98.86	98.38	87.60	89.41	94.03
Ferrous metal	0.00	0.05	0.00	0.00	0.00
Nonferrous metal	0.00	0.43	1.48	0.00	0.00
Glass	0.00	0.00	0.47	1.89	1.28
Organic other	0.63	0.35	8.11	3.17	5.94
Inorganic other	0.00	0.09	0.10	0.95	0.73
Fines (-1.30 mm)	0.51	0.70	2.24	4.58	8.02

(continued)

TABLE C-8. (continued)

	Rotational speed				
	9 rpm				
Feedrate (Mg/h)	1.97	2.55	7.23	10.49	17.01
Air-dry moisture content (%)	0.00	12.00	3.57	16.13	22.58
Oven-dry moisture content (%)	7.00	19.35	9.65	21.62	28.29
As-received ash content (%)	6.36	6.95	14.65	6.43	6.67
Oven-dry ash content (%)	6.84	8.62	16.22	8.20	9.30
Organic content (%)	99.67	87.76	97.34	96.88	93.89
Characteristic size (mm)	51.6	77.6	68.4	67.2	46.0
Nominal size (mm)	81.8	95.1	91.9	92.1	91.7
Bulk density (kg/m ³)	26.91	36.85	44.54	53.83	66.64
Component distribution					
Paper and plastic	99.64	95.46	96.81	96.19	91.89
Ferrous metal	0.00	0.00	0.06	0.00	0.00
Nonferrous metal	0.03	0.79	1.71	0.01	0.14
Glass	0.00	0.13	0.03	0.40	0.91
Organic other	0.03	2.30	0.53	0.69	2.00
Inorganic other	0.00	0.00	0.00	0.18	0.31
Fines (-1.30 mm)	0.30	1.32	0.86	2.53	5.05

(continued)

TABLE C-8. (continued)

	Rotational speed				
	12 rpm				
Feedrate (Mg/h)	3.62	6.09	6.69	7.42	17.64
Air-dry moisture content (%)	8.00	6.69	10.34	15.63	17.24
Oven-dry moisture content (%)	14.45	14.19	17.01	21.27	23.86
As-received ash content (%)	6.90	11.58	6.08	7.01	8.39
Oven-dry ash content (%)	8.07	13.49	7.33	8.91	11.02
Organic content (%)	99.38	95.00	97.88	98.49	93.13
Characteristic size (mm)	69.0	61.5	52.9	56.9	33.3
Nominal size (mm)	91.6	75.8	86.4	78.5	72.1
Bulk density (kg/m ³)	34.44	30.28	43.25	43.41	56.55
Component distribution					
Paper and plastic	99.01	85.35	96.83	97.47	89.29
Ferrous metal	0.00	0.06	0.00	0.00	0.00
Nonferrous metal	0.00	3.66	0.09	0.12	0.46
Glass	0.01	0.01	0.11	0.06	0.70
Organic other	0.37	9.65	1.05	1.04	3.84
Inorganic other	0.00	0.00	0.00	0.00	0.14
Fines (-1.30 mm)	0.61	1.27	1.92	1.33	5.57

TABLE C-9. PROPERTIES OF UNDERSIZE FRACTION - JANUARY 1981

	Rotational speed				
	6 rpm				
Feedrate (Mg/h)	0.96	2.97	5.58	9.62	12.57
Air-dry moisture content (%)	22.22	18.18	21.74	18.75	20.63
Oven-dry moisture content (%)	27.70	22.70	26.80	22.51	25.01
As-received ash content (%)	19.74	36.46	27.54	47.35	46.97
Oven-dry ash content (%)	27.30	47.17	37.62	61.10	62.63
Organic content (%)	73.83	54.91	55.03	43.06	37.89
Characteristic size (mm)	9.7	6.7	1.4	4.5	2.4
Nominal size (mm)	14.9	12.3	12.4	11.8	10.6
Bulk density (kg/m ³)	77.22	65.04	112.14	114.82	187.11
Component distribution					
Paper and plastic	67.80	51.91	41.90	32.39	28.59
Ferrous metal	0.00	0.00	0.00	0.00	0.00
Nonferrous metal	0.07	0.49	0.02	0.00	0.11
Glass	3.06	15.81	13.95	20.48	11.89
Organic other	6.03	3.00	13.13	10.67	9.30
Inorganic other	0.00	1.16	1.34	0.00	4.07
Fines (-1.30 mm)	23.04	27.63	29.66	36.46	46.04

(continued)

TABLE C-9. (continued)

	Rotational speed				
	9 rpm				
Feedrate (Mg/h)	1.97	2.55	7.23	10.49	17.01
Air-dry moisture content (%)	0.00	22.39	23.29	31.29	27.27
Oven-dry moisture content (%)	7.56	25.29	27.52	34.13	32.20
As-received ash content (%)	20.78	46.71	39.79	42.40	31.01
Oven-dry ash content (%)	22.48	62.52	54.90	64.37	45.74
Organic content (%)	83.19	45.25	53.63	49.15	65.59
Characteristic size (mm)	11.2	4.6	5.0	5.1	7.1
Nominal size (mm)	13.5	12.5	12.1	14.0	12.7
Bulk density (kg/m ³)	52.23	151.39	168.69	206.66	131.68
Component distribution					
Paper and plastic	77.25	29.74	44.33	37.37	57.58
Ferrous metal	0.00	0.03	0.00	0.00	0.00
Nonferrous metal	0.73	0.06	0.04	1.23	0.06
Glass	1.84	22.16	11.84	21.02	9.27
Organic other	5.94	15.51	9.30	11.78	8.01
Inorganic other	0.71	2.26	1.31	2.57	1.14
Fines (-1.30 mm)	13.53	30.24	33.18	26.03	23.94

(continued)

TABLE C-9. (continued)

	Rotational speed				
	12 rpm				
Feedrate (Mg/h)	3.62	6.09	6.69	7.42	17.64
Air-dry moisture content (%)	24.00	19.57	25.00	26.92	23.08
Oven-dry moisture content (%)	27.96	22.85	31.09	30.84	28.11
As-received ash content (%)	41.21	39.40	22.69	39.32	35.57
Oven-dry ash content (%)	57.21	51.07	32.92	56.85	49.48
Organic content (%)	46.64	55.47	64.70	51.17	55.90
Characteristic size (mm)	4.9	8.1	8.7	5.0	5.5
Nominal size (mm)	13.1	15.9	15.1	12.2	13.6
Bulk density (kg/m ³)	160.04	188.24	131.36	153.31	122.23
Component distribution					
Paper and plastic	37.15	44.41	53.23	40.60	49.36
Ferrous metal	0.00	0.01	0.00	0.00	0.00
Nonferrous metal	0.21	0.85	0.95	0.00	0.60
Glass	14.21	9.01	7.36	16.72	17.56
Organic other	9.49	11.06	11.47	10.57	6.54
Inorganic other	2.17	3.16	0.00	0.00	0.15
Fines (-1.30 mm)	36.77	31.50	26.99	32.11	25.75

TABLE C-10. TROMMEL PERFORMANCE CHARACTERIZATION - MAY 1981

	Rotational speed 6 rpm				
Feedrate (Mg/h)	2.82	5.05	5.21	26.44	29.56
Screening efficiency (%)	90.3	70.3	96.1	23.3	23.9
Oversize split (%)	38.26	29.84	18.93	79.25	80.64
Undersize split (%)	61.74	70.16	81.07	20.75	19.36
Oversize flow rate (Mg/h)	1.08	1.52	0.99	20.96	23.84
Undersize flow rate (Mg/h)	1.74	3.53	4.22	5.48	5.72
True undersize in oversize fraction (%)	17.4	65.4	17.5	86.3	76.7
Heating value improvement (%)	155.7	146.9	186.4	107.3	107.8
Energy recovery (%)	59.6	43.8	35.3	85.0	86.9
Ash/energy content of oversize fraction (kg/GJ)	4.13	7.24	5.95	17.47	5.38
Organic quality improvement (%)	131.1	143.3	135.0	105.7	108.1
Organic recovery (%)	50.2	42.8	25.6	83.8	87.1
Ash content removal (%)	67.0	44.0	51.8	5.4	20.8
Moisture content removal (%)	34.6	13.6	25.8	4.7	2.5
Sample time (sec)	65	58	49	24	24
Leading edge residence time (sec)	102	109	99	81	74
Tracer residence time (sec)	61	59	48	58	64
Motor power requirement (kW)	3.7	4.1	3.7	5.3	4.4
Specific motor power requirements (kWh/Mg)	1.31	0.81	0.71	0.20	0.15

(continued)

TABLE C-10. (continued)

	Rotational speed 9 rpm				
Feedrate (Mg/h)	6.32	6.48	8.56	31.67	32.90
Screening efficiency (%)	90.5	62.4	65.0	46.4	41.6
Oversize split (%)	29.09	52.55	52.58	67.41	74.43
Undersize split (%)	70.91	47.45	47.42	32.59	25.57
Oversize flow rate (Mg/h)	1.84	4.59	4.50	21.35	24.49
Undersize flow rate (Mg/h)	4.48	1.89	4.06	10.32	8.41
True undersize in oversize fraction (%)	25.7	54.4	48.5	55.9	48.2
Heating value improvement (%)	142.7	128.0	128.0	121.7	116.5
Energy recovery (%)	41.5	67.3	67.3	82.0	86.7
Ash/energy content of oversize fraction (kg/GJ)	7.44	7.76	4.02	6.46	3.45
Organic quality improvement (%)	128.5	119.3	114.8	114.1	114.7
Organic recovery (%)	37.4	62.7	60.4	76.9	92.5
Ash content removal (%)	53.3	35.4	62.7	34.7	57.0
Moisture content removal (%)	27.1	15.7	21.9	4.9	7.4
Sample time (sec)	41	42	34	31	45
Leading edge residence time (sec)	80	77	77	69	80
Tracer residence time (sec)	42	46	38	52	52
Motor power requirement (kW)	3.6	3.7	3.7	4.7	4.7
Specific motor power requirements (kWh/Mg)	0.57	0.57	0.43	0.15	0.14

(continued)

TABLE C-10. (continued)

	Rotational speed 12 rpm				
Feedrate (Mg/h)	2.92	9.90	10.59	17.69	46.55
Screening efficiency (%)	68.0	78.0	65.9	57.0	25.9
Oversize split (%)	63.72	38.91	56.04	60.93	81.97
Undersize split (%)	36.28	61.09	43.96	39.07	18.03
Oversize flow rate (Mg/h)	1.86	3.86	5.94	10.78	38.16
Undersize flow rate (Mg/h)	1.06	6.04	4.65	6.91	8.39
True undersize in oversize fraction (%)	26.9	44.2	40.6	48.4	63.0
Heating value improvement (%)	122.1	141.6	123.4	119.7	113.5
Energy recovery (%)	77.8	55.1	69.1	72.9	93.0
Ash/energy content of oversize fraction (kg/GJ)	4.30	4.63	10.81	15.08	10.10
Organic quality improvement (%)	108.9	122.2	114.7	113.2	109.7
Organic recovery (%)	69.4	47.6	64.3	69.0	89.9
Ash content removal (%)	27.2	57.4	7.9	(-4.3)	25.5
Moisture content removal (%)	21.9	29.1	14.7	12.4	(-2.3)
Sample time (sec)	36	34	29	19	21
Leading edge residence time (sec)	63	75	65	62	59
Tracer residence time (sec)	35	34	42	32	47
Motor power requirement (kW)	3.7	3.9	3.6	4.1	6.1
Specific motor power requirements (kWh/Mg)	1.27	0.39	0.34	0.23	0.13

TABLE C-11. PROPERTIES OF FEED MATERIAL - MAY 1981

	Rotational speed 6 rpm				
Feedrate (Mg/h)	2.82	5.05	5.21	26.44	29.56
Air-dry moisture content (%)	24.88	25.29	24.53	32.67	21.83
Oven-dry moisture content (%)	30.65	31.11	31.07	38.59	28.54
As-received ash content (%)	19.63	18.44	19.06	15.99	9.29
Oven-dry ash content (%)	28.30	26.77	27.65	26.04	13.00
As-received heating value (kJ/kg)	10,067	9,711	8,278	8,067	12,696
Oven-dry heating content (kJ/kg)	14,516	14,097	12,009	13,136	17,766
Ash/energy content (kg/GJ)	19.5	18.99	23.02	19.82	7.32
Organic content (%)	74.13	63.66	71.47	54.28	80.97
True oversize content (%)	31.6	10.4	15.7	10.9	18.8
Characteristic size (mm)	19.1	8.6	8.9	6.4	14.2
Nominal size (mm)	73.2	25.1	40.9	25.1	45.0
Component distribution (%)					
Paper and plastic	62.86	51.33	50.00	36.53	67.88
Ferrous metal	0.00	0.00	0.00	0.00	0.00
Nonferrous metal	1.27	0.12	0.50	0.04	0.07
Glass	5.31	8.38	2.91	9.72	2.47
Organic other	11.28	12.33	21.46	17.74	13.09
Inorganic other	0.00	2.05	0.43	0.63	0.35
Fines (-1.30 mm)	19.28	25.79	24.70	35.34	16.14

(continued)

TABLE C-11. (continued)

	Rotational speed 9 rpm				
Feedrate (Mg/h)	6.32	6.48	8.56	31.67	32.90
Air-dry moisture content (%)	27.48	24.83	20.03	22.23	27.61
Oven-dry moisture content (%)	32.91	31.08	26.26	28.05	32.07
As-received ash content (%)	21.95	17.86	16.99	13.94	11.70
Oven-dry ash content (%)	32.72	25.91	23.04	19.37	17.23
As-received heating value (kJ/kg)	9,662	11,599	12,304	11,590	12,507
Oven-dry heating content (kJ/kg)	14,401	16,830	16,685	16,109	18,411
Ash/energy content (kg/GJ)	22.72	15.40	13.81	12.02	9.36
Organic content (%)	76.90	79.15	82.46	74.35	72.11
True oversize content (%)	21.6	24.0	27.0	29.7	38.6
Characteristic size (mm)	12.2	17.0	18.0	17.8	26.2
Nominal size (mm)	55.1	46.0	58.9	64.8	91.2
Component distribution (%)					
Paper and plastic	61.82	65.45	73.14	65.23	41.34
Ferrous metal	0.10	0.20	0.00	0.00	0.00
Nonferrous metal	0.01	0.34	0.98	2.09	0.02
Glass	2.36	2.63	1.35	4.80	5.09
Organic other	15.07	13.71	9.32	9.12	30.77
Inorganic other	0.00	0.12	0.08	0.13	0.15
Fines (-1.30 mm)	20.64	17.55	15.13	18.64	22.63

(continued)

TABLE C-11. (continued)

	Rotational speed 12 rpm				
Feedrate (Mg/h)	2.92	9.90	10.59	17.69	46.55
Air-dry moisture content (%)	16.55	25.25	21.93	28.21	9.57
Oven-dry moisture content (%)	24.18	31.77	29.03	34.52	16.75
As-received ash content (%)	9.93	17.26	16.42	17.88	21.30
Oven-dry ash content (%)	13.10	25.30	23.13	27.30	25.58
As-received heating value (kJ/kg)	13,762	11,214	11,345	10,330	13,853
Oven-dry heating content (kJ/kg)	18,151	16,436	15,985	15,776	16,640
Ash/energy content (kg/GJ)	7.22	15.39	14.47	17.30	15.37
Organic content (%)	90.93	78.32	84.42	82.80	79.82
True oversize content (%)	46.7	21.7	33.3	31.4	30.3
Characteristic size (mm)	14.2	13.2	21.8	20.3	19.6
Nominal size (mm)	83.1	46.2	57.9	77.5	69.9
Component distribution (%)					
Paper and plastic	83.26	62.65	73.70	59.14	77.36
Ferrous metal	0.00	0.00	0.00	0.00	0.01
Nonferrous metal	0.00	0.16	0.07	0.18	0.10
Glass	0.72	1.49	1.22	1.46	7.32
Organic other	7.67	15.67	10.72	23.66	2.46
Inorganic other	0.02	0.06	0.67	0.08	0.35
Fines (-1.30 mm)	8.33	19.97	13.62	15.48	12.40

TABLE C-12. PROPERTIES OF OVERSIZE FRACTION - MAY 1981

	Rotational speed 6 rpm				
Feedrate (Mg/h)	2.82	5.05	5.21	26.44	29.56
Air-dry moisture content (%)	12.82	20.0	15.38	30.61	21.28
Oven-dry moisture content (%)	20.06	26.87	23.07	36.77	27.82
As-received ash content (%)	6.48	10.33	9.18	15.12	7.36
Oven-dry ash content (%)	8.10	14.12	11.93	23.91	10.2
As-received heating value (kJ/kg)	15,675	14,263	15,432	8,654	13,687
Oven-dry heating content (kJ/kg)	19,608	19,503	20,060	13,687	18,963
Ash/energy content (kg/GJ)	4.13	7.24	5.95	17.47	5.38
Organic content (%)	97.19	91.21	96.46	57.38	87.50
Characteristic size (mm)	64.0	23.1	50.0	8.6	17.8
Nominal size (mm)	90.4	53.1	75.9	31.8	50.5
Bulk density (kg/m ³)	40.7	31.4	35.6	63.6	0.00
Component distribution (%)					
Paper and plastic	96.29	84.19	89.10	39.93	74.51
Ferrous metal	0.00	0.00	0.00	0.00	0.00
Nonferrous metal	1.31	0.00	2.43	0.03	0.06
Glass	0.00	0.78	0.00	9.06	1.36
Organic other	0.90	7.02	7.36	17.45	12.02
Inorganic other	0.00	0.00	0.00	0.68	0.13
Fines (-1.30 mm)	1.50	8.01	1.11	32.85	11.92

(continued)

TABLE C-12. (continued)

	Rotational speed 9 rpm				
Feedrate (Mg/h)	6.32	6.48	8.56	31.67	32.90
Air-dry moisture content (%)	17.50	19.64	13.33	20.78	25.23
Oven-dry moisture content (%)	23.98	26.21	20.50	26.68	29.69
As-received ash content (%)	10.26	11.53	6.33	9.11	5.03
Oven-dry ash content (%)	13.49	15.62	7.96	12.43	7.15
As-received heating value (kJ/kg)	13,789	14,852	15,755	14,106	14,569
Oven-dry heating content (kJ/kg)	18,138	20,127	19,817	19,239	20,721
Ash/energy content (kg/GJ)	7.44	7.76	4.02	6.46	3.45
Organic content (%)	98.84	94.46	94.70	84.81	82.74
Characteristic size (mm)	52.6	29.7	37.3	32.8	61.7
Nominal size (mm)	73.7	60.7	71.4	69.3	93.7
Bulk density (kg/m ³)	36.9	43.2	30.7	60.7	67.6
Component distribution (%)					
Paper and plastic	96.44	89.62	89.85	78.90	47.01
Ferrous metal	0.00	0.23	0.00	0.00	0.00
Nonferrous metal	0.00	0.00	1.66	3.05	0.03
Glass	0.00	0.25	0.00	1.68	1.85
Organic other	2.40	4.84	4.35	5.91	35.73
Inorganic other	0.00	0.07	0.00	0.19	0.00
Fines (-1.30 mm)	1.16	4.99	3.54	10.27	15.38

(continued)

TABLE C-12. (continued)

	Rotational speed 12 rpm				
Feedrate (Mg/h)	2.92	9.90	10.59	17.69	46.55
Air-dry moisture content (%)	10.87	14.29	17.46	23.40	9.38
Oven-dry moisture content (%)	18.88	22.53	24.77	30.23	17.1
As-received ash content (%)	7.23	7.36	15.13	18.64	15.88
Oven-dry ash content (%)	8.91	9.50	20.11	26.72	19.16
As-received heating value (kJ/kg)	16,802	15,884	13,995	12,363	15,719
Oven-dry heating content (kJ/kg)	20,713	20,504	18,603	17,719	18,971
Ash/energy content (kg/GJ)	4.30	4.63	10.81	15.08	10.10
Organic content (%)	99.03	95.71	96.83	93.73	87.53
Characteristic size (mm)	58.4	36.8	40.1	38.6	23.9
Nominal size (mm)	89.7	65.3	67.6	86.9	74.9
Bulk density (kg/m ³)	29.4	44.5	42.1	47.2	38.3
Component distribution (%)					
Paper and plastic	95.36	91.37	91.73	68.17	85.70
Ferrous metal	0.00	0.00	0.00	0.00	0.00
Nonferrous metal	0.00	0.00	0.00	0.01	0.10
Glass	0.00	0.01	0.02	0.29	3.93
Organic other	3.67	4.34	5.10	25.56	1.83
Inorganic other	0.00	0.00	0.00	0.01	0.08
Fines (-1.30 mm)	0.97	4.28	3.15	5.96	8.36

TABLE C-13. PROPERTIES OF UNDERSIZE FRACTION - MAY 1981

	Rotational speed 6 rpm				
Feedrate (Mg/h)	2.82	5.50	5.21	26.44	29.56
Air-dry moisture content (%)	32.35	27.54	26.67	40.54	24.14
Oven-dry moisture content (%)	37.20	32.91	32.94	45.53	31.52
As-received ash content (%)	27.78	21.89	21.37	19.34	17.33
Oven-dry ash content (%)	44.24	32.63	31.86	35.51	25.31
As-received heating value (kJ/kg)	7,139	7,911	6,795	6,005	8,762
Oven-dry heating content (kJ/kg)	11,368	11,791	10,133	11,024	12,795
Ash/energy content (kg/GJ)	38.92	27.67	31.44	32.21	19.78
Organic content (%)	59.88	51.91	65.63	42.30	58.27
Characteristic size (mm)	5.8	4.8	5.3	2.5	4.8
Nominal size (mm)	14	12.2	12.4	9.7	11.7
Bulk density (kg/m ³)	151.0	136.2	209.5	185.0	174.7
Component distribution (%)					
Paper and plastic	42.19	37.32	40.89	23.47	40.26
Ferrous metal	0.00	0.00	0.00	0.00	0.00
Nonferrous metal	1.25	0.17	0.05	0.12	0.13
Glass	8.58	11.62	3.59	12.31	7.06
Organic other	17.69	14.59	24.74	18.83	18.01
Inorganic other	0.00	2.93	0.54	0.45	0.82
Fines (-1.30 mm)	30.29	33.37	30.19	44.82	33.73

(continued)

TABLE C-13. (continued)

	Rotational speed 9 rpm				
Feedrate (Mg/h)	6.32	6.48	8.56	31.67	32.90
Air-dry moisture content (%)	31.58	30.57	27.45	25.22	34.52
Oven-dry moisture content (%)	36.57	36.49	32.64	30.89	38.97
As-received ash content (%)	26.75	24.86	28.80	23.92	31.14
Oven-dry ash content (%)	42.17	39.15	42.76	34.61	51.03
As-received heating value (kJ/kg)	8,162	8,366	8,898	6,661	7,139
Oven-dry heating content (kJ/kg)	12,867	13,172	13,210	9,638	11,698
Ash/energy content (kg/GJ)	32.77	29.72	32.37	35.91	43.62
Organic content (%)	67.88	60.18	68.87	52.73	41.21
Characteristic size (mm)	6.1	5.6	7.1	4.1	2.8
Nominal size (mm)	15.2	15.2	15.0	9.9	9.7
Bulk density (kg/m ³)	164.6	146.4	105.1	202.6	172.9
Component distribution (%)					
Paper and plastic	47.61	36.63	54.59	37.01	24.81
Ferrous metal	0.14	0.17	0.00	0.00	0.00
Nonferrous metal	0.02	0.71	0.22	0.07	0.00
Glass	3.34	5.28	2.84	11.27	14.51
Organic other	20.27	23.55	14.28	15.72	16.40
Inorganic other	0.00	0.16	0.18	0.00	0.58
Fines (-1.30 mm)	28.62	31.50	27.89	35.93	43.70

(continued)

TABLE C-13. (continued)

	Rotational speed 12 rpm				
Feedrate (Mg/h)	2.92	9.90	10.59	17.69	46.55
Air-dry moisture content (%)	26.53	32.73	27.63	35.71	10.42
Oven-dry moisture content (%)	33.47	38.10	34.46	41.23	14.96
As-received ash content (%)	14.69	23.45	18.05	16.67	45.93
Oven-dry ash content (%)	22.08	37.89	27.54	28.36	54.01
As-received heating value (kJ/kg)	9,084	8,571	8,293	7,493	5,120
Oven-dry heating content (kJ/kg)	13,654	13,846	12,653	12,749	13,846
Ash/energy content (kg/GJ)	16.17	27.37	21.77	22.24	89.70
Organic content (%)	76.72	67.26	68.62	65.76	44.82
Characteristic size (mm)	10.7	5.8	7.1	6.1	4.6
Nominal size (mm)	20.8	14.0	15.2	15.0	10.7
Bulk density (kg/m ³)	88.4	177.9	133.2	158.6	113.0
Component distribution (%)					
Paper and plastic	62.03	44.37	50.77	45.06	39.50
Ferrous metal	0.00	0.00	0.00	0.00	0.03
Nonferrous metal	0.00	0.26	0.17	0.45	0.00
Glass	1.99	2.43	2.74	3.28	22.74
Organic other	14.69	22.89	17.85	20.70	5.32
Inorganic other	0.05	0.10	1.52	0.20	1.59
Fines (-1.50 mm)	21.24	29.95	26.95	30.31	30.82

TABLE C-14. TROMMEL PERFORMANCE CHARACTERIZATION - AUGUST 1981

	Rotational speed 6 rpm				
Feedrate (Mg/h)	2.64	3.56	7.80	10.63	23.26
Screening efficiency (%)	95.6	96.0	85.2	75.3	45.0
Oversize split (%)	21.13	28.37	31.88	42.28	68.31
Undersize split (%)	78.87	71.63	68.12	57.72	31.69
Oversize flow rate (Mg/h)	0.56	1.01	2.49	4.49	15.89
Undersize flow rate (Mg/h)	2.09	2.55	5.32	6.13	7.37
True undersize in oversize fraction (%)	17.31	10.45	37.14	44.73	56.60
Organic quality improvement (%)	132.1	147.2	142.1	119.5	114.8
Organic recovery (%)	27.9	41.8	45.3	50.5	78.4
Ash content removal (%)	70.0	71.7	67.3	42.8	28.4
Moisture content removal (%)	48.2	37.5	23.8	21.4	4.6
Sample time (sec)	60.5	63.5	36	30.5	35
Leading edge residence time (sec)	50	38	51	0.00	46
Tracer residence time (sec)	44	40	47	54	61
Motor power requirement (kW)	3.9	3.8	3.7	4.1	5.0
Specific motor power requirements (kWh/Mg)	1.48	1.07	0.47	0.39	0.21

(continued)

TABLE C-14. (continued)

	Rotational speed 9 rpm				
Feedrate (Mg/h)	1.47	6.91	10.17	12.71	33.28
Screening efficiency (%)	9.79	86.7	88.4	65.9	37.1
Oversize split (%)	18.37	29.81	32.22	49.88	73.11
Undersize split (%)	81.63	70.19	67.78	50.12	26.89
Oversize flow rate (Mg/h)	0.27	2.06	3.28	6.34	24.33
Undersize flow rate (Mg/h)	1.20	4.85	6.90	6.37	8.95
True undersize in oversize fraction (%)	9.40	36.18	27.63	51.91	62.24
Organic quality improvement (%)	133.0	129.7	128.8	120.4	110.2
Organic recovery (%)	24.4	38.7	41.5	60.1	80.6
Ash content removal (%)	61.1	68.3	66.7	37.8	28.1
Moisture content removal (%)	55.0	15.4	44.3	7.5	4.7
Sample time (sec)	76.5	34	39	46	37
Leading edge residence time (sec)	43	38	40	39	35
Tracer residence time (sec)	49	36	33	48	49
Motor power requirement (kW)	3.8	3.9	4.0	4.2	4.9
Specific motor power requirements (kWh/Mg)	2.59	0.56	0.39	0.33	0.15

(continued)

TABLE C-14. (continued)

	Rotational speed 12 rpm				
Feedrate (Mg/h)	2.11	4.91	7.12	13.79	32.06
Screening efficiency (%)	96.4	94.1	91.0	79.9	55.2
Oversize split (%)	23.24	24.90	29.78	41.91	58.48
Undersize split (%)	76.76	75.10	70.22	58.09	41.52
Oversize flow rate (Mg/h)	0.72	1.23	2.12	5.78	18.75
Undersize flow rate (Mg/h)	1.39	3.68	5.00	8.01	13.31
True undersize in oversize fraction (%)	12.19	18.75	23.30	34.95	57.57
Organic quality improvement (%)	122.0	122.1	128.6	124.6	115.2
Organic recovery (%)	28.4	30.4	38.3	52.2	67.4
Ash content removal (%)	68.9	73.4	70.2	52.4	5.8
Moisture content removal (%)	(-62.4)	31.9	27.7	23.2	37.8
Sample time (sec)	51.5	36	40	30.5	20
Leading edge residence time (sec)	46	35	36	30	26
Tracer residence time (sec)	35	27	26	36	40
Motor power requirement (kW)	3.9	3.9	3.8	3.9	5.0
Specific motor power requirements (kWh/Mg)	1.85	0.79	0.53	0.28	0.16

TABLE C-15. PROPERTIES OF FEED MATERIAL - AUGUST 1981

	Rotational speed 6 rpm				
Feedrate (Mg/h)	2.64	3.56	7.80	10.63	23.26
Air-dry moisture content (%)	28.36	26.27	34.74	26.59	25.03
Oven-dry moisture content (%)	33.22	32.09	39.71	31.37	29.80
As-received ash content (%)	23.63	18.43	18.76	17.55	22.06
Oven-dry ash content (%)	35.39	27.14	31.12	27.55	31.42
Organic content (%)	73.37	65.79	65.47	76.07	73.13
True oversize content (%)	17.65	25.63	21.28	23.46	29.66
Characteristic size (mm)	9.5	11.7	10.8	13.9	17.4
Nominal size (mm)	46.9	58.7	46.6	26.4	64.4
Component distribution (%)					
Paper and plastic	61.78	57.76	64.45	68.26	62.87
Ferrous metal	0.02	0.16	0.06	0.05	0.00
Nonferrous metal	0.62	0.88	0.58	0.83	0.63
Glass	3.93	8.38	4.79	4.38	5.71
Organic other	11.59	8.03	10.11	7.82	10.25
Inorganic other	0.40	1.76	0.75	0.84	0.80
Fines (-1.30 mm)	21.66	23.03	19.26	17.82	19.74

(continued)

TABLE C-15. (continued)

	Rotational speed 9 rpm				
Feedrate (Mg/h)	1.47	6.91	10.17	12.71	33.28
Air-dry moisture content (%)	28.62	24.88	31.51	31.43	28.62
Oven-dry moisture content (%)	33.80	30.04	34.52	36.63	40.71
As-received ash content (%)	15.72	20.31	19.20	15.08	15.75
Oven-dry ash content (%)	23.75	29.03	29.32	23.80	26.56
Organic content (%)	73.54	73.56	74.87	76.32	77.37
True oversize content (%)	16.83	19.22	23.34	24.04	27.61
Characteristic size (mm)	9.3	11.3	11.2	14.1	16.8
Nominal size (mm)	49.1	46.4	56.9	48.5	60.8
Component distribution (%)					
Paper and plastic	61.93	66.29	66.96	68.11	66.64
Ferrous metal	0.00	0.00	0.00	0.00	0.00
Nonferrous metal	0.48	0.51	0.52	0.23	0.19
Glass	2.75	5.44	4.49	3.20	3.51
Organic other	11.61	7.27	7.91	8.21	10.73
Inorganic other	0.99	0.94	1.26	2.18	0.67
Fines (-1.30 mm)	22.24	19.55	18.86	18.07	18.26

(continued)

TABLE C-15. (continued)

	Rotational speed 12 rpm				
Feedrate (Mg/h)	2.11	4.91	7.12	13.79	32.06
Air-dry moisture content (%)	34.48	29.56	34.34	31.39	25.86
Oven-dry moisture content (%)	40.41	35.41	39.07	36.30	30.79
As-received ash content (%)	11.73	21.10	22.58	13.42	13.44
Oven-dry ash content (%)	19.69	32.66	37.06	21.06	25.45
Organic content (%)	78.19	80.48	72.07	75.84	75.81
True oversize content (%)	22.14	20.49	23.11	27.27	24.83
Characteristic size (mm)	14.2	13.2	12.3	14.6	16.2
Nominal size (mm)	49.1	46.1	52.8	50.6	50.8
Component distribution (%)					
Paper and plastic	63.29	68.49	66.15	67.32	62.97
Ferrous metal	0.00	0.04	0.58	0.00	0.20
Nonferrous metal	1.61	0.49	0.97	0.12	0.24
Glass	3.36	2.39	6.40	4.24	4.34
Organic other	14.90	11.98	5.90	8.52	12.84
Inorganic other	1.27	0.70	2.45	1.64	1.16
Fines (-1.30 mm)	15.57	15.91	17.55	18.16	18.25

TABLE C-16. PROPERTIES OF OVERSIZE FRACTION - AUGUST 1981

	Rotational speed 6 rpm				
Feedrate (Mg/h)	2.64	3.56	7.80	10.63	23.26
Air-dry moisture content (%)	10.50	14.01	24.95	18.43	23.22
Oven-dry moisture content (%)	17.22	20.05	30.25	24.65	28.44
As-received ash content (%)	7.09	5.22	6.14	10.04	15.79
Oven-dry ash content (%)	8.56	6.53	8.80	13.33	22.07
Organic content (%)	96.93	96.84	93.00	90.93	83.92
Characteristic size (mm)	55.0	57.6	42.5	38.1	31.7
Nominal size (mm)	85.2	79.8	68.9	64.5	75.7
Bulk density (kg/m ³)	70.8	74.6	98.2	105.7	107.0
Component distribution (%)					
Paper and plastic	92.01	93.66	88.81	83.70	72.21
Ferrous metal	0.00	0.00	0.00	0.11	0.00
Nonferrous metal	2.46	2.18	0.85	1.59	0.87
Glass	0.00	0.00	0.32	0.48	1.38
Organic other	4.92	3.37	4.19	7.24	11.71
Inorganic other	0.00	0.00	0.23	0.15	0.32
Fines (-1.30 mm)	0.61	0.79	5.60	6.73	13.51

(continued)

TABLE C-16. (continued)

	Rotational speed 9 rpm				
Feedrate (Mg/h)	1.47	6.91	10.17	12.71	33.28
Air-dry moisture content (%)	8.54	19.60	20.78	28.50	8.54
Oven-dry moisture content (%)	15.20	25.41	19.24	33.88	38.78
As-received ash content (%)	6.12	6.43	6.40	9.38	11.33
Oven-dry ash content (%)	7.22	8.62	7.92	14.18	18.51
Organic content (%)	97.78	95.40	96.46	91.88	85.26
Characteristic size (mm)	63.4	43.9	51.4	34.5	25.8
Nominal size (mm)	88.8	70.2	77.8	66.9	69.2
Bulk density (kg/m ³)	43.6	75.9	89.5	110.7	102.0
Component distribution (%)					
Paper and plastic	97.24	85.98	92.43	85.77	74.25
Ferrous metal	0.00	0.00	0.00	0.00	0.00
Nonferrous metal	1.67	0.52	0.84	0.06	0.25
Glass	0.00	0.16	0.22	0.66	1.56
Organic other	0.54	9.41	4.02	6.12	10.99
Inorganic other	0.00	0.11	0.10	0.13	0.52
Fines (-1.30 mm)	0.55	3.82	2.39	7.26	12.43

(continued)

TABLE C-16. (continued)

	Rotational speed 12 rpm				
Feedrate (Mg/h)	2.11	4.91	7.12	13.79	32.06
Air-dry moisture content (%)	63.13	18.39	22.76	22.54	13.21
Oven-dry moisture content (%)	65.63	24.11	28.25	27.89	19.16
As-received ash content (%)	3.65	5.62	6.73	6.39	12.66
Oven-dry ash content (%)	10.63	7.40	9.38	8.86	15.66
Organic content (%)	95.40	98.23	92.91	94.47	87.30
Characteristic size (mm)	48.9	47.7	50.1	42.5	29.8
Nominal size (mm)	23.4	68.9	74.3	68.6	63.4
Bulk density (kg/m ³)	62.1	69.7	89.5	88.3	103.2
Component distribution (%)					
Paper and plastic	89.86	90.53	92.69	90.65	72.47
Ferrous metal	0.01	0.00	0.66	0.00	0.12
Nonferrous metal	4.12	0.58	2.24	0.20	0.18
Glass	0.00	0.00	0.05	0.16	1.45
Organic other	5.54	7.70	2.33	3.82	14.82
Inorganic other	0.00	0.00	0.58	0.11	0.41
Fines (-1.30 mm)	0.47	1.19	1.45	5.06	10.55

TABLE C-17. PROPERTIES OF UNDERSIZE FRACTION - AUGUST 1981

	Rotational speed 6 rpm				
Feedrate (Mg/h)	2.64	3.56	7.80	10.63	23.26
Air-dry moisture content (%)	33.14	31.13	39.32	32.57	28.92
Oven-dry moisture content (%)	37.51	36.86	44.13	36.30	32.72
As-received ash content (%)	26.61	22.29	23.22	24.18	34.70
Oven-dry ash content (%)	42.58	35.30	41.56	37.96	51.57
Organic content (%)	67.06	53.42	65.94	65.18	49.86
Characteristic size (mm)	5.8	4.9	5.3	5.8	3.8
Nominal size (mm)	13.0	13.3	13.7	13.9	10.2
Bulk density (kg/m ³)	167.2	218.0	210.3	207.4	244.0
Component distribution (%)					
Paper and plastic	53.68	43.54	53.06	56.96	42.75
Ferrous metal	0.03	0.22	0.09	0.00	0.00
Nonferrous metal	0.12	0.36	0.45	0.28	0.10
Glass	4.98	11.70	6.87	7.25	15.03
Organic other	13.38	9.88	12.88	8.22	7.11
Inorganic other	0.51	2.47	1.00	1.35	1.84
Fines (-1.30 mm)	27.30	31.83	25.65	25.94	33.17

(continued)

TABLE C-17. (continued)

	Rotational speed 9 rpm				
Feedrate (Mg/h)	1.47	6.91	10.17	12.71	33.28
Air-dry moisture content (%)	33.14	27.12	36.61	34.34	33.14
Oven-dry moisture content (%)	37.99	32.00	41.78	39.34	45.95
As-received ash content (%)	17.03	25.64	23.00	20.24	26.19
Oven-dry ash content (%)	27.47	37.70	39.50	33.37	48.46
Organic content (%)	68.09	64.27	64.61	60.82	55.93
Characteristic size (mm)	6.4	6.4	5.0	4.9	4.0
Nominal size (mm)	14.7	13.5	11.8	12.0	10.9
Bulk density (kg/m ³)	157.6	184.5	214.0	230.8	186.4
Component distribution (%)					
Paper and plastic	53.98	57.92	54.86	50.53	45.95
Ferrous metal	0.00	0.00	0.00	0.00	0.00
Nonferrous metal	0.21	0.50	0.36	0.39	0.06
Glass	3.36	7.69	6.52	5.72	8.82
Organic other	14.11	6.35	9.75	10.29	9.98
Inorganic other	1.22	1.30	1.82	4.24	1.07
Fines (-1.30 mm)	27.12	26.24	26.69	28.83	34.12

(continued)

TABLE C-17. (continued)

	Rotational speed 12 rpm				
Feedrate (Mg/h)	2.11	4.91	7.12	13.79	32.06
Air-dry moisture content (%)	25.81	33.27	39.25	37.77	43.67
Oven-dry moisture content (%)	32.78	39.16	43.66	42.37	47.18
As-received ash content (%)	15.08	24.96	27.49	17.21	20.73
Oven-dry ash content (%)	22.43	41.03	48.80	29.86	39.25
Organic content (%)	72.98	74.59	62.34	62.40	59.62
Characteristic size (mm)	8.2	7.9	5.8	5.0	2.9
Nominal size (mm)	19.8	18.5	15.2	11.7	15.1
Bulk density (kg/m ³)	132.0	146.7	196.2	184.4	211.4
Component distribution (%)					
Paper and plastic	55.24	61.19	54.94	50.49	49.57
Ferrous metal	0.00	0.05	0.56	0.00	0.31
Nonferrous metal	0.86	0.46	0.41	0.06	0.31
Glass	4.37	3.18	9.08	7.18	8.42
Organic other	17.74	13.40	7.40	11.91	10.05
Inorganic other	1.65	0.94	3.23	2.74	2.24
Fines (-1.30 mm)	20.14	20.78	24.38	27.62	29.10

APPENDIX D

MAINTENANCE, OPERATION, AND ECONOMIC CONTRIBUTION

TABLE D-1. TROMMEL MAINTENANCE

Date (1980)	Labor Hours		Materials		Maintenance activity
	Day shift	Night shift	Description	Cost	
Nov. 26		4	Grease	*	Lubricate entire trommel.
Nov. 28		12	Set Screws	*	Disassemble, clean, and reassemble drive wheel.
Dec. 1		14	Set Screws	*	Drive wheel had come loose and jammed against trommel housing. Drill new set holes, clean and replace drive wheel. Inspect clutch assembly.
Dec. 8		4	Set Screws	*	Set screw sheared. Clear out same, drill set hole deeper, reposition loose drive wheel, install new set screw bolts with Loctite.
Dec. 26 (1981)		2.5	Grease	*	Lubricate wheel bearings.
Jan. 6		3	Welding rod	*	Weld broken lifter bar and screen.
Jan. 12	6	24	Keystock, set screws	*	Dismantle, repair, replace worn drive wheel.
Jan. 13		1	Grease	*	Lubricate entire trommel.
Jan. 14		1.5	Tire, rim, washers	*	Mount new tire and rim (automobile tires used as additional support).
Jan. 15		1	Dexron oil	*	Replenish oil in clutch housings.
Jan. 26		4	Two new drive sheaves	*	Change sheaves.
Jan. 27		3.5	Welding rod	*	Grind out and weld fractures in carrier ring. Adjust vari-speed sheave.
Jan. 28		1	none	-	Adjust vari-speed sheave.
Feb. 9		1.5	Welding rod	*	Weld broken lifter bar.
Feb. 10	6	3	Welding rod	*	Weld wheel and stop plate to drive shaft.
Feb. 13		8	Wheel, shaft, 2 bearings	1,125	Install new drive wheel assembly.
Feb. 14		3	2 clutches	835	Install new clutches.
Mar. 13		24	Steel plate, bolts, weld rod	*	Weld cracked carrier ring and broken screen. Grind out and weld fractures in carrier ring. Weld steel plate for added strength inside trommel.
Mar. 14	30		-	-	Continue with March 13 work.
Mar. 16		16	1/2 in. Steel plate	*	Install ten 1/2 in. x 10 in. x 44 in. steel plates and twenty 1/2 in. x 6 in. x 8 in. steel gussets inside the trommel around circumference of the drive wheel cleaned track for structural strength.
Mar. 19		8	Welding rod	*	Weld 1/2 in. plate inside trommel.
Mar. 20		4	Welding rod	*	Same as March 19.
Mar. 23		1	Weld rod	*	Repair cracked welds on discharge chute to eliminate material spillage.
Mar. 30		8	1/2 in. Steel plate	*	Install twenty 1/2 in. x 3 in. x 6 in. steel plates to strengthen carrier rings by welding the plates inside the trommel across the area of the ring joints.
Apr. 2		3	1/2 in. Steel plate	*	Install five 1/2 in. x 3 in. x 6 in. steel plates as per Mar. 30.
Apr. 11	15	16	Welding rod	*	Weld cracked carrier ring.
Apr. 12	12		Welding rod	*	Same as April 11.
Apr. 13		8	Welding rod	*	Same as April 11.
Apr. 14		0	Welding rod	*	Same as April 11.
Apr. 15		6	Welding rod	*	Same as April 11.
Apr. 23-30	-	-	-	12,600	Fabricate and install new carrier ring by outside contractor.
Apr. 30		2	None	-	Clean up after contractor and adjust feed conveyor.
May 14		1	Dexron oil	*	Change oil in clutches.
July 5		4	Weld rod	*	Reweld loose trunnion wheel.
July 20		1	Dexron oil	*	Change oil in clutches.
Oct. 6		1	Dexron oil	*	Replenish oil in clutches.
Oct. 27		9	Grease and 1/2 chain link	*	Lubricate entire trommel. Tighten drive chain by removing 1/2 link.
Total	69	243		\$15,060	

* Total cost of grease, oil, welding rod, steel plate, and miscellaneous parts estimated at \$500.

TABLE D-2. TONS OF DRDF PELLETS SHIPPED TO WRIGHT-PATTERSON AIR FORCE BASE

Day	Tons DRDF shipped											
	1980				1981							
	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.
1											20.00	
2				21.86	19.75							10.00
3				21.85	22.35	11.54					21.35	
4	23.59			19.75	22.27						21.63	
5	22.62			21.68	20.53							
6	18.16			23.01			9.95		20.18			
7	22.89					11.27	10.94		22.52			
8			20.66			11.60	10.82				23.05	10.00
9			23.58	20.82		12.82	9.35		19.60			10.00
10	23.04			19.04		4.48			22.45		19.48	
11	20.22										21.17	
12	23.74		19.79	20.16			10.36					
13			22.13	20.34	42.23		11.19					10.00
14	38.63		15.00			11.19	12.46		20.21			
15			22.20			19.07	11.88				18.06	
16			47.51		22.13	19.91			21.67			
17	18.69				21.34	10.67			20.28		22.73	10.00
18				22.11	21.04		11.50				18.50	
19			47.43	21.48	21.86							
20			21.08	21.38	19.52	10.87	12.62		20.65			10.00
21			45.04			12.13	12.40		20.61		20.79	10.00
22			22.64			12.40						
23				20.90	22.70							11.00
24				20.34	21.74				21.83		19.46	
25				18.99	42.07						18.06	
26				19.55			12.24					
27			22.07	21.38	20.04							
28							14.17		21.29		19.59	
29											10.00	
30					21.29				23.15		19.00	13.00
31					18.26				20.38			
Total Tons	211.58	0*	329.13	354.64	379.12	147.95	149.88	0*	274.82	0*	292.87	94.00
(Hg)	(191.94)		(298.58)	(321.72)	(343.93)	(134.22)	(135.97)		(249.31)		(265.69)	(84.28)

* No pellets shipped during these months, DRDF placed in warehouse for later shipment.

TABLE D-3. DAILY HOURS OF TROMMEL OPERATION

Day	Hours trommel in operation											
	1980						1981					
	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.
1	No	1.0	H	S	S	12.9	No	H	No	8.1	9.3	14.1
2	No	8.7	No	5.9	8.9	12.6	No	No	7.2	S	6.3	11.2
3	No	8.4	No	13.2	15.9	12.3	S	3.3	No	8.0	11.7	11.2
4	11.2	12.3	S	19.7	14.1	13.3	No	7.8	H	15.2	13.8	S
5	11.3	9.8	No	8.6	13.0	S	No	6.5	S	14.2	11.2	No
6	11.8	11.3	9	13.8	14.8	7.8	20.9	2.7	No	9.9	S	11.3
7	12.3	S	3.9	12.0	11.4	11.3	8.3	S	6.7	12.2	H	14.1
8	11.2	8.5	14.2	S	S	13.9	13.0	7.5	2.1	10.4	7.0	6.7
9	S	11.5	12.3	9.6	9.3	12.4	7.8	8.4	7.8	S	12.5	6.3
10	8.0	12.5	13.6	10.0	15.3	13.9	S	3.9	11.8	8.5	12.8	11.5
11	14.4	10.4	S	20.8	15.1	Down	6.8	9.4	No	14.0	12.6	S
12	14.9	3.4	No	13.3	6.0	S	9.2	0.4	S	No	15.9	8.0
13	13.4	No	19.6	15.4	8.8	22.4	10.8	No	11.2	13.4	S	9.8
14	15.8	S	14.0	No	Down	20.4	12.5	S	13.8	9.6	6.5	20.2
15	13.7	No	18.9	S	S	18.9	12.5	6.5	10.9	8.5	6.5	10.7
16	S	7.4	5.0	12.2	21.6	21.1	7.7	7.7	11.4	S	12.0	12.5
17	9.6	9.1	20.0	14.1	15.0	11.2	S	4.1	13.0	5.1	13.7	12.0
18	14.7	6.5	S	13.1	13.9	12.9	8.0	7.9	12.4	6.1	12.5	S
19	4.8	1.9	9.1	12.9	11.5	S	13.5	6.5	S	4.6	9.0	9.1
20	6.8	6.4	9.9	15.9	11.3	8.8	3.2	2.8	5.6	12.2	S	12.0
21	13.0	S	15.3	9.9	12.1	15	13.1	S	14.3	11.0	10.2	13.3
22	9.3	6.8	13.5	S	S	15.4	9.3	6.9	11.7	11.3	12.4	10.2
23	S	2.9	12.6	8.1	8.1	Down	9.7	0.4	13.4	S	12.2	No
24	9.3	12.8	No	20.3	12.3	Down	S	14.4	8.1	6.7	13.1	No
25	10.0	H	S	11.9	13.4	Down	9.0	6.3	10.0	13.9	13.0	S
26	13.0	2.2	No	11.3	13.8	S	13.2	10.2	S	14.1	13.9	5.0
27	H	No	16.4	13.6	13.0	Down	8.6	10.1	5.1	14.3	S	11.1
28	7.1	S	No	14.7	13.0	Down	7.2	S	10.6	7.0	8.9	16.0
29	No	No	22.8	-	S	Down	8.8	7.7	11.5	14.0	14.6	9.8
30	S	No	11.8	-	8.0	Down	7.9	6.9	13.7	S	14.3	9.9
31	-	No	4.3	-	12.8	-	S	-	13.6	No	-	11.4
Ttl Hr.	236.1	153.8	246.2	300.2	312.4	256.5	221.0	148.3	225.9	252.3	285.9	267.4
Ttl D.	21	20	19	23	25	18	22	23	22	24	25	24
Days	0	0	0	0	1	8	0	0	0	0	0	0
Downtime*												

Legend: S = Sunday; H = Holiday; No = RDF facility not in operation; Down = plant would have operated if trommel not shut down.

* Days downtime for trommel only.

TABLE D-4. ECONOMIC CONTRIBUTION OF TROMMEL

Rotational speed RPM	Feedrate Mg/h	Oversize split %	Oversize flow rate Mg/h	Oven dry heating value kJ/kg			Value of heating* value increase \$/Mg	Cost of** trommel \$/Mg	Economic† contribution of trommel \$/Mg
				Infeed	Oversize	Increase			
Oct. 1980									
6	1.76	36.08	10.64	17,415	20,810	3,395	6.68	9.65	- 2.97
6	3.13	49.31	1.54	17,749	19,775	2,026	3.99	3.97	0.02
6	4.74	29.39	1.39	18,547	19,932	1,385	2.73	4.40	- 1.67
6	12.84	47.40	6.09	16,120	20,952	4,832	9.51	1.01	8.50
6	23.91	76.09	18.19	18,947	19,219	272	0.54	0.34	0.20
9	2.82	45.87	1.29	18,732	20,719	1,987	3.91	4.74	- 0.83
9	5.85	38.07	2.23	17,827	20,552	2,725	5.36	2.75	2.61
9	10.55	69.75	7.36	18,662	22,123	3,461	6.81	0.83	5.98
9	15.86	64.77	10.27	16,524	19,631	3,107	6.11	0.60	5.51
9	22.55	64.51	14.51	16,456	18,964	2,508	4.94	0.42	4.52
12	3.43	35.48	1.22	17,587	23,847	6,260	12.32	5.04	7.28
12	9.11	63.70	5.80	16,902	20,284	3,382	6.66	1.06	5.60
12	13.62	44.49	6.06	18,266	20,834	2,568	5.05	1.01	4.04
12	30.27	68.53	20.74	18,743	20,743	2,000	3.94	0.30	3.64
12	38.52	68.73	26.47	17,809	19,527	1,718	3.38	0.23	3.15
May 1981									
6	2.82	38.26	1.08	14,516	19,608	5,092	10.02	5.68	4.34
6	5.05	29.84	1.51	14,097	19,503	5,406	10.64	4.07	6.57
6	5.21	18.93	0.99	12,009	20,060	8,051	15.84	6.22	9.62
6	26.44	79.25	20.95	13,136	13,687	551	1.08	0.29	††
6	29.56	80.64	23.84	17,766	18,963	1,197	2.36	0.26	2.10
9	6.32	29.09	1.84	14,401	18,138	3,737	7.35	3.33	4.02
9	6.48	52.55	3.41	16,830	20,127	3,297	6.49	1.80	++
9	8.56	52.58	4.50	16,685	19,817	3,132	6.16	1.36	4.80
9	31.67	67.41	21.35	16,109	19,239	3,130	6.16	0.29	5.87
9	32.90	74.43	24.49	18,411	20,721	2,310	4.55	0.25	4.30
12	2.92	63.72	1.86	18,151	20,713	2,562	5.04	3.29	1.75
12	9.90	38.91	3.85	16,436	20,504	4,068	8.01	1.59	6.42
12	10.59	56.04	5.93	15,985	18,603	2,618	5.15	1.03	++
12	17.69	60.93	10.78	15,776	17,719	1,943	3.82	0.57	++
12	46.55	81.97	38.16	16,640	18,971	2,331	4.59	0.16	++

* Value of heating value increase = $\frac{\text{kJ/kg increase} \times \$1.968/10^6 \text{ kJ}}{\text{Mg}/10^3 \text{ kg}} = \$/\text{Mg of oversize}$

** Cost of trommel = $\frac{\$6.13/\text{h}}{\text{Mg/h oversize flow rate}} = \$/\text{Mg of oversize}$

† Economic contribution = value of heating value increase - cost of trommel = \$/Mg of oversize material

†† Heating value fuel specification not met. Heating value below 15,119 kJ/kg dry basis.

++ Ash content fuel specification not met. Ash content above 15% dry basis.