AN ABSTRACT OF THE THESIS OF

Thomas Michael Swett for the degree of Master of Science in Forest Products presented on August 6, 1997. Title: Drying of Submerchantable Length Dimensional Lumber.

Signature redacted for privacy.

Abstract approved: ______________________

Michael R. Milota

As lumber producers are faced with a diminished and increasingly expensive raw material, the need to maximize resource recovery will increase. Trim-ends (particularly from waned boards) often contain some of the highest quality wood in any given log and lack functionality only in length. This waste, traditionally chipped for pulp, can be finger-jointed into lumber if the material can be dried properly for gluing. This research explores how different length submerchantable pieces dry relative to each other and merchantable lumber when subjected to typical commercial drying schedules as well as how trim-ends in two different charge configurations perform in a conventional dry kiln.

Sixteen -foot long, Douglas-fir boards in nominal four, six and eight inch widths were used to produce simulated trim-ends in 0.5-, 1.0-, 1.5-, 2.0-, 2.5- and 3.5-foot lengths. Eight-foot-long boards were also dried as a comparison to the simulated trim-ends. One course of each width was stacked tight while a second was stacked with a 0.375 inch space between the ends of the blocks. Four charges were dried using United States Department of Agriculture (USDA) recommended schedules for high and low

grade Douglas-fir. Eight by four foot, self stickered aluminum racks with slots corresponding to each of the sampled widths and a wire-mesh box (random piled), loaded with actual trim-ends and subjected to the USDA low-grade Douglas-fir schedule, were compared.

Although it was demonstrated that length affects the final moisture content of pieces with similar anatomy and initial moisture content, it is not a significant factor in determining the mean final moisture content of the average charge of short blocks. Using the methods in this experiment, sorting by length would not be necessary. Current commercial kiln schedules are likely in appropriate for drying short pieces. An applicable schedule should be developed using real time moisture content monitoring in the kiln (i.e. load-cells). Providing a space between blocks can significantly accelerate the drying rate of fresh lumber and may have a greater effect when combined with an appropriate kiln schedule. The aluminum racks and the wire-mesh box exhibited comparable final moisture content deviation when used to dry trim-ends. The space efficiency of the wire-mesh box was it primary disadvantage and was approximately 63 percent that of the aluminum racks.

Drying of Submerchantable Length Dimensional Lumber

by

Thomas Michael Swett

A THESIS

submitted to

Oregon State University

in partial fulfillment of
the requirements for the
degree of

Master of Science

Completed August 6, 1997
Commencement June 1998

Master of Science thesis of Thomas Michael Swett presented on August 6, 1997

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Dean of Graduate School

I understand that my thesis will become part of the permanent collection of Oregon State University libraries. My signature below authorizes release of my thesis to any reader upon request.

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Thomas Michael Swett, Author

ACKNOWLEDGMENTS

Appreciation is due my major professor, Michael Milota, for his encouragement, help and support. Without his willingness to be my advisor I would not have been able to attend Oregon State University.

Additionally, I would like to acknowledge my committee members Terry Brown, Ron Miller and Eldon Olsen for their work as well as Swanson Superior Lumber and Seneca Sawmill Company. Without them this project could not have been completed.

Finally, I would like to express my gratitude to the entire College of Forestry. The family atmosphere projected by the College is unique and sustaining and I will never forget it.

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I. INTRODUCTION

Between the years of 1980 and 1993, the volume of timber offered for sale by the US Forest Service declined by just over 60 percent nationwide (5). Because of the inability of private land harvests to provide enough additional stumpage, raw material volume available to industry has been significantly impacted (1). As the available US timber supply decreases in quantity and quality, efforts to utilize the existing resource more efficiently will intensify. Additionally, the average age of harvested timber is decreasing which will lead to an increase in the proportion of lumber containing defects, juvenile wood and total mill residue produced. This situation presents opportunity for value added manufacturing.

Low-grade lumber could be resawn to remove large knots and defect. These short pieces can be finger jointed together to produce a high grade or even clear product. Furthermore, trim ends from the production of dimensional lumber have already been broken down into a structural form that lacks functionality only in length. Since many trim pieces are produced to meet wane requirement in finished lumber, they also contain some of the highest quality fiber in any given log. Finger-jointed reconstitution of these small pieces of dimensional lumber could potentially multiply value ten-fold over pulp chips (11).

For a chop-stock or trim-end jointing and gluing process to be successful, the moisture content of the raw material must first be reduced to an acceptable level. Since much end-trim is green (easily the majority in Douglas-fir), one must have an understanding of how short dimensional lumber piece geometry affects drying and how to configure kiln charges to integrate with readily accessible, existing lumber drying equipment.

II. OBJECTIVES

- To determine the influence of length and width on the drying properties of submerchantable length dimensional lumber.
- To explore two methods for drying submerchantable length dimensional lumber within a common dry kiln.

III. LITERATURE REVIEW

An increase in the utilization of young, small, fast-grown trees by the lumber manufacturing industry in the production of dimensional lumber precipitates the issues examined in this research. Harvested volumes from public ownerships have recently declined significantly with little indication that they will ever return to previous levels. This has put increased pressure on private lands to supply raw material . At present, the majority of private US timber stock is of a submerchantable age class. Within the next 50 years, this vast resource will be increasingly harvested as it reaches (often minimum merchantable) rotation age (1,2). This will be quite evident with the maturation of fast-grown southern pine plantation lands. Included are tables outlining growing stock age classes within the Pacific Northwest and the South, the two largest timber producing regions in the US (see Tables 1 and 2).

Table 1. Percent of timberland area and harvest by age group for northwestern private ownerships (1).

	1980		2000		2030	
Owner/Age	**Area %**	**Harvest %**	**Area %**	**Harvest %**	**Area %**	**Harvest %**
Industrial						
< 50 years	76.2	1.7	88.7	2[illegible].1	93.5	76.5
50-100 years	17.1	62.9	11.2	67.7	6.5	23.5
100+ years	6.7	35.4	.1	.2	0.0	0.0
Nonindustry						
< 50 years	61.5	7.0	50.7	3.1	55.4	1.3
50-100 years	31.4	42.6	48.0	91.0	44.1	95.9
100+ years	7.0	50.5	1.3	5.9	.5	2.8

Table 2. Percent of timberland area and harvest by age group for southern private ownerships (2).

	1980		2000		2030	
Owner/Age	**Area %**	**Harvest %**	**Area %**	**Harvest %**	**Area %**	**Harvest %**
Industrial						
< 17 years	42.4		63.3		59.6	
18-27 years	29.9	10.7	34.1	89.1	33.3	65.7
> 27 years	27.8	89.3	2.6	10.9	7.1	34.3
Nonindustry						
< 17 years	29.6		52.0		36.5	
18-27 years	29.4	10.6	27.9	36.0	27.4	5.7
> 27 years	41.0	89.4	20.1	64.0	36.0	94.3

As manufacturers increase their utilization of these smaller logs there will be impacts in wood quality and lumber recovery efficiency. This correlates to the quality and quantity of trim-ends produced. Juvenile wood versus mature wood character and small log processing considerations will be discussed to illuminate the value and opportunity presented by finger-jointing trim-ends.

As the inventories of timber growers move towards minimum merchantable age, the proportion of juvenile wood in the raw material supply will continue to increase. Juvenile or 'crown-formed' wood is laid down on the bole while still under the hormonal influence of an apical meristem. This causes a number of differences within the cellular composition of wood which adversely affect its structural properties when compared to that of mature wood (9).

As a tree ages and its live crown extends further from the ground, typically followed by self pruning, the lower portion of the plant is removed from the influence of apical meristems and begins to make the transition from juvenile to mature wood production. The completion of this transition is marked by a 20-25 degree reduction in microfibril angle, increased specific gravity, strength, dimensional stability, and a dramatic increase in stiffness (7). Microfibril angle (MFA) describes the orientation of cellulose fiber strands in relation to the longitudinal axis of the cell which is the long or load bearing axis of sawn lumber. This change is usually completed after 12-15 years of growth in softwoods (8,12) which results in a saw log that contains a juvenile wood core which is jacketed by the more desirable mature wood. Therefore, the younger the tree, the greater proportion of juvenile wood that is present in any given log. A southern pine study in an East Texas plantation found that 55 percent of log volume in the 20 year old trees was composed of juvenile wood while making up only 16 percent within the 50 year old group (7).

The microfibril angle exhibited by juvenile wood cells is relatively large. Similar to reinforcing steel in concrete, microfibrils act as the supporting structure within the wood matrix and perform this function best when aligned longitudinally or closer to zero. As MFA increases, the ability of microfibrils to counter stress and resist longitudinal shrinkage decreases. Because of juvenile wood MFA differences from that of mature wood (up to 30 degrees), juvenile wood lumber exhibits significantly lower strength and stiffness values as well as greater longitudinal shrinkage (9).

Studies have shown that lumber produced from juvenile wood is significantly less stiff and strong than that produced from mature wood as measured by modulus of elasticity and rupture (MOE & MOR) (3, 6, 7, 10, 13,14). A study of loblolly pine in North Carolina helps to illustrate the inferiority of juvenile wood lumber. Nominal 2 by 4 inch lumber was manufactured from 28-year-old fast-grown plantation stock. The strength and stiffness of boards composed completely of juvenile wood were, on average, 45 to 65 percent lower than those composed completely of mature wood. Additionally, about 20 percent of juvenile wood lumber did not conform to US National Design Specifications (NDS) for grades No. 1, No. 2 and No. 3 (6). Furthermore, approximately 85 percent of lumber produced from the 20 year old southern pine stand mentioned previously failed to meet MOE design specifications for grades No. 2 and No. 3 (7). Similar studies and observations have reported results which agree with Kretschmann (6) and MacPeak (7). Juvenile wood quality has raised such concern that it has been suggested repeatedly that grading rules be revised in order to account for and accommodate the use of lumber manufactured from fast-grown stock (3,10,13,14).

An additional concern with the use of juvenile wood lumber is its tendency to shrink longitudinally. Mature wood microfibrils are oriented nearly longitudinally which positions them to counteract wood's tendency to shrink when drying, therefore mature wood lumber exhibits negligible longitudinal shrinkage. In contrast, the high MFA of juvenile wood allows for significant reductions in length during the drying process. A board that is composed of half juvenile wood and half mature wood is extremely prone to warp drying defects. This occurs because of the differential shrinkage between the mature side of the lumber versus the juvenile causing a cup or bow to towards the juvenile face (9).

Wane is the expression of the round outer surface of the log which disrupts the angular shape of the sawn lumber. Small logs have a high surface area to volume ratio which leads to higher production of waned jacket boards that must be trimmed. Also, the higher degree of taper present contributes to an increased incidence of wane when compared to traditional mature saw timber. This adds up to higher trim-end volume. Since dimensional lumber is most often sold in lengths ascending in two-foot increments, the removal of wane often results in the trimming of a portion of square lumber which lacks only functional length.

The processing of small logs presents some unique problems and opportunities related to wood quality. Juvenile wood contained within the core of a small log is converted with relative efficiency into square dimensional lumber. It is the outer mature wood component of a small log that is subject to volume losses due to slabs and waned jacket boards; above and beyond normal saw kerf and trim. The high surface area to volume ratio exhibited by small logs means that a higher proportion of mature wood becomes waste when compared to traditional raw materials. Not only is the fiber quality of this wood excellent, these ends also tend have a smaller percentage of knots.

At present time, the majority of this trim-end waste is converted to pulp chips. Not only does this represent a loss of material volume but this additional trim can be some of the highest quality wood in any given log since is comes from the outer jacket.

If a cost effective method could be developed to reconstitute these trim ends into dimensional lumber, the proportion of high quality mature wood recovered from any given small log could increase significantly. Swanson Superior Lumber Company general manager, Richard Rohl, estimates the value added to such reconstituted products would be tenfold over the current use of pulp chips (11).

IV. PROCEDURE

IV.1 Materials and Equipment

Approximately 5000 board feet of nominal two-inch by four-inch and nominal two-inch by six-inch dimensional lumber as well as mill generated trim-ends were donated by Swanson Superior Lumber Company of Noti, Oregon and approximately 800 board feet of nominal two-inch by eight-inch dimensional lumber was donated by Seneca Sawmill Company of Eugene, Oregon.

Long lumber was moved to the Forest Research Lab from Noti and Eugene in two shipments on July 24, 1996 and August 7, 1996. Four and six-inch wide boards which were destined to be cut into small sample blocks and eight foot comparison boards were sixteen feet in length. Two-inch by eight-inch boards collected for the July shipment were 12 feet in length while the August shipment boards were 16 feet in length. Those used for outer buffer layers were nominal two-inch by six-inch and eight feet long. The material was loaded on a flatbed truck and covered with a tarp in order to minimize moisture loss during transport. Since each shipment of lumber was enough to run two kiln charges, half of the shipment was wrapped in a tarp and placed in the shade for approximately one week.

On September 14, 1996, mill generated trim-ends and the necessary long comparison boards were brought to the Forest Research Laboratory. Mill generated trim-ends were stacked by Swanson Superior employees on two pallets. The first of which contained nominal two-inch by four-inch material while the second contained nominal two-inch by six-inch material. Length of the trim-ends ranged from seven inches to 24 inches. This shipment was covered and kept indoors until it was completely utilized just over two weeks later.

The four by eight foot, self-stickered aluminum racks employed for much of the research were purchased from Carter-Sprague Incorporated of Beaverton, Oregon. Two each had slot widths of four, six and eight inches (Figure 1). These racks allowed for short samples to be stack in a configuration similar to that used to dry long lumber. Additionally, a 64 cubic foot box constructed of plywood and 2-inch by 4-inch wire mesh was used to hold a kiln charge. Plywood sides perpendicular to wire mesh sides facilitated unidirectional air flow and 2x4 supports provided lift-truck mobility (Figure 2). The wire mesh box allowed trim-ends to be randomly piled rather than stacked. Delmhorst Instrument Company of Towaco, New Jersey provided a resistance type moisture meter (model RDM-2S) and thirty-six, three pin, remote probes. The kiln employed in the research was steam heated, had an 1000 board foot capacity, reversible fans and a Foxboro pneumatic controller.

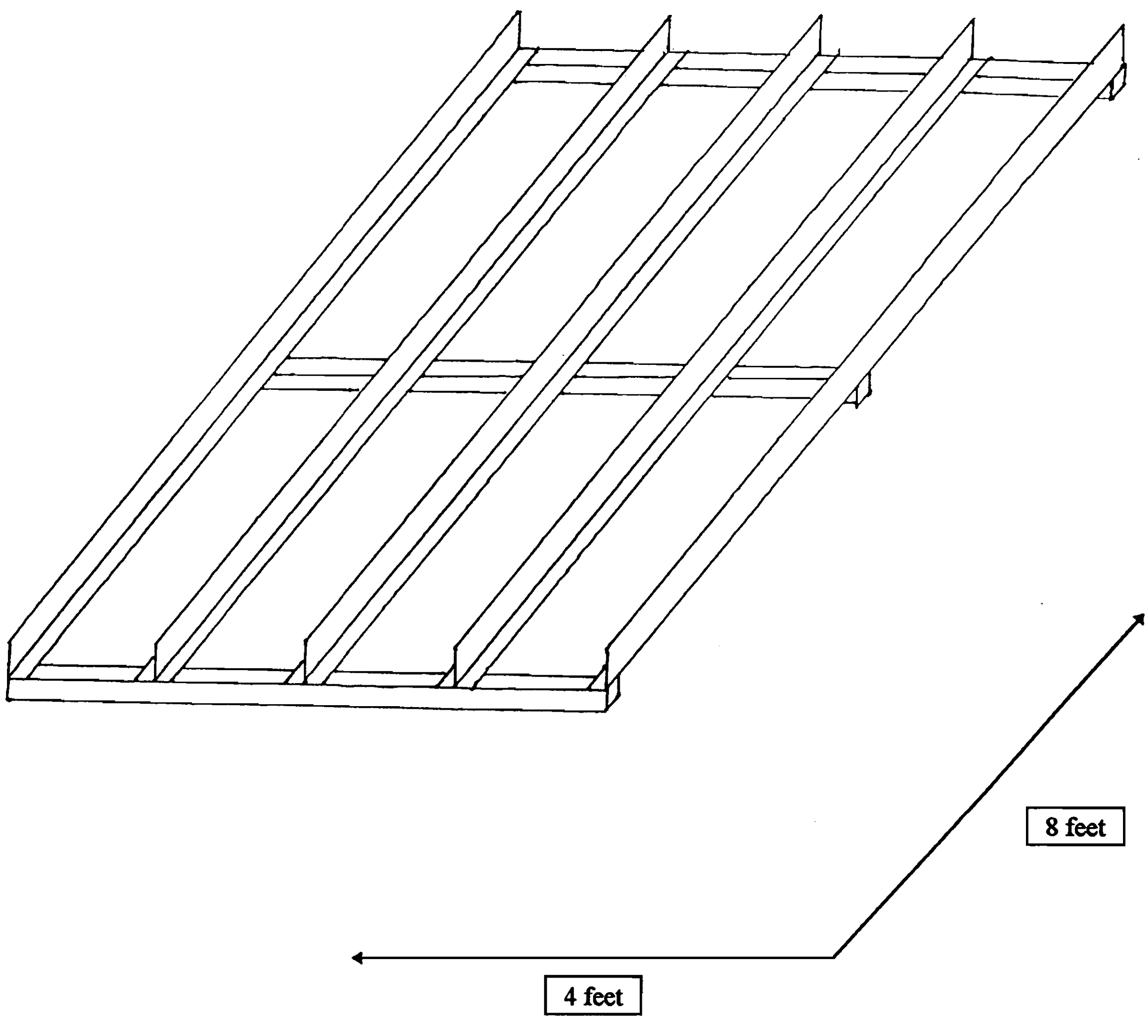

Figure 1. Schematic example of a Carter-Sprague rack. The depicted rack has four slots and would therefore be suitable for 12 inch wide lumber. The four inch, six inch and eight inch compatible racks contain twelve, eight and six slots respectively across their four foot face.

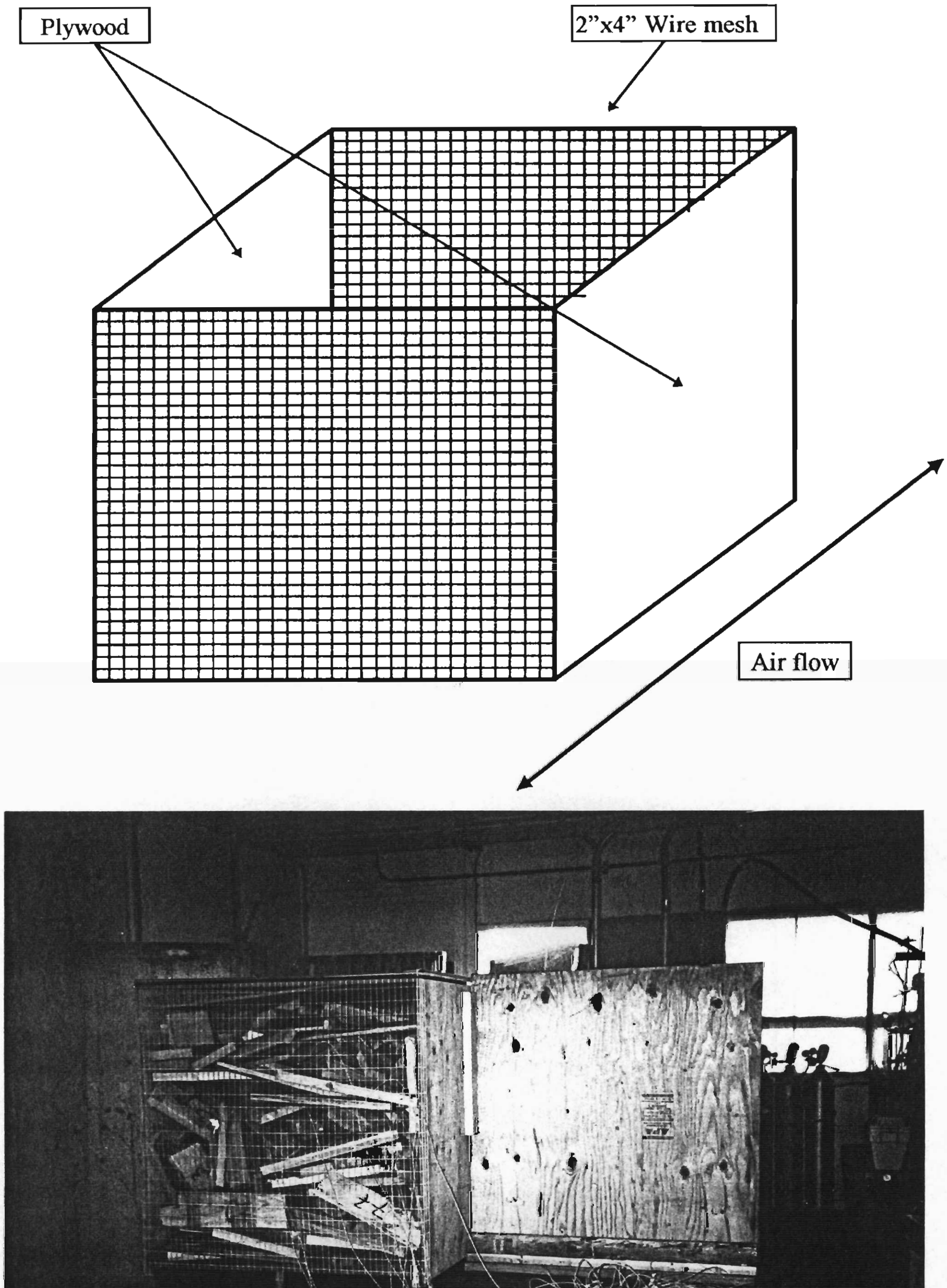

Figure 2. *Top*. Schematic of wire mesh box construction. *Bottom*. Photograph of loaded and baffled box. Note the moisture meter pin group wires protruding from the load.

IV.2 Geometric Drying Properties

IV.2.1 Sample Preparation

To determine the effects of piece geometry on drying rate, samples were cut from nominal two-by-four, two-by-six, and two-by-eight inch Douglas-fir lumber sixteen feet in length. One piece of each, 0.5, 1.0, 1.5, 2.0, 2.5 and 3.5 feet long sample blocks, were cut from an individual board. At each end of the board, 2.5 feet were discarded (total of 5.0 feet) to reduce any influence of end drying of the lumber during transport and handling. Blocks were cut from the boards in order of sample length from left to right. On successive boards, the beginning sample length was shifted one to the right. For example, if a 0.5-foot sample was cut first from board one, then the final sample cut would be 3.5 feet in length. A 1.0-foot sample would then be cut first from board two and the length of the final sample would be 0.5 feet (Figure 3).

Sample blocks were then marked with a number that represented the sample width, length, long board origin, and relative position within the original sixteen-foot board. Each individual block or board was then weighed. Percent heartwood was estimated for each sample, based on natural color differences, by placing a transparent grid on the end of the board. The grid had ten equal sections, each representing ten percent of the total area to provide a gauge for the estimate. Growth rings per-inch were measured for each block at the center of its cross section.

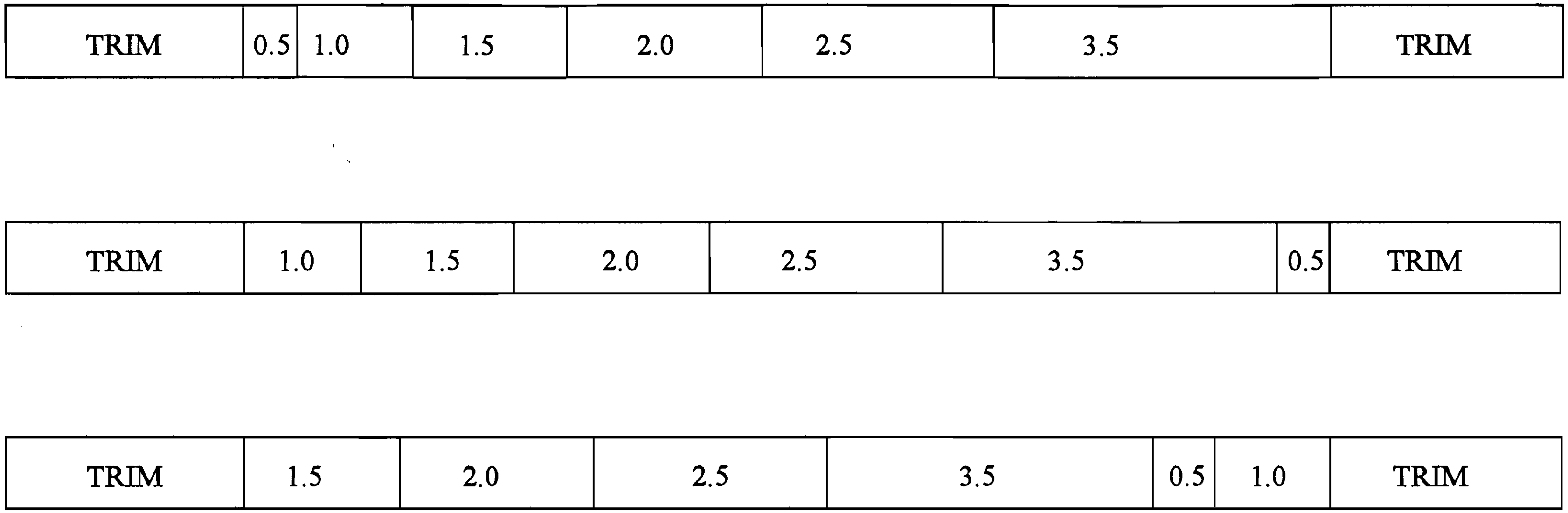

Figure 3. Example of cutting pattern from each unique sixteen-foot board. The sample length cut first (left to right, ignoring trim) from the previous board was always moved to the far right hand position and therefore cut last.

Finally, the distance of the block's nearest edge from the pith was estimated using a set of concentric quarter circles printed on a transparent sheet. The radius of the circle matching the ring curvature at the pith face of the piece was recorded as the estimated distance to the pith. In addition to the manufactured sample blocks, eight-foot long lumber in each of the three widths (4,6 and 8 inches) was used as a comparison and was quantified exactly like other samples.

IV.2.2 Charge Formation

Sample blocks were placed within the appropriately-sized drying rack to form a four-by-eight foot charge (load). Two racks were provided for each of the three width dimensions tested. One rack for each dimension consisted of blocks butted tightly together and the second rack held blocks that were spaced 0.375 inches apart to take advantage of any increase in longitudinal moisture content loss from the board ends.

One series of sample blocks (from the same sixteen-foot board) in each rack (total of six) was selected to receive sets of resistance probes to monitor moisture content during the drying process. This three-pin probe system was installed parallel with the grain of the sample block and the attached cable routed to the moisture meter unit outside the kiln. Core moisture content pins were installed by drilling 0.75-inch deep holes using a drill bit stop and the manufacture's template while the shell moisture content pin could easily be driven the 0.375 inches into the sample. Pin sets were centered within the face of each block. The meter estimated core moisture content by measuring the resistance between the two core pins and shell moisture content using one core pin and the small shell pin (Figure 4). These two values were averaged to estimate the overall moisture content of the sample on a dry basis.

A completed charge consisted of thirteen courses (layers) orientated on the kiln cart as shown in Figure 5. Courses one, two, twelve and thirteen were eight-foot long green two-by-six lumber which were included as buffer layers. This was done to provide for more uniform conditions within the sample courses. Layers three and four were eight-inch-wide blocks stacked tightly and with a 0.375 inch space, respectively. Layer five consisted of a course of eight-foot-long, eight-inch-wide lumber used as a comparison. Courses six and seven held tightly stacked and 0.375 inch spaced, six inch wide blocks, respectively, followed by layer eight which was eight feet long, six inch wide lumber again for comparison. Courses nine, ten and eleven followed the same pattern but employed four inch wide lumber. Moisture probe wires were routed through the kiln door and plugged into a self constructed switching device to simplify monitoring (Figure 6).

Four separate charges were constructed in this manner with lumber acquired on two different days. For each of the two trips to obtain lumber, one charge was completely built the same day while the second charge was constructed approximately one week later. All cutting, quantifying and loading was done on the same day. Stored lumber was left full length, tarped and placed in the shade.

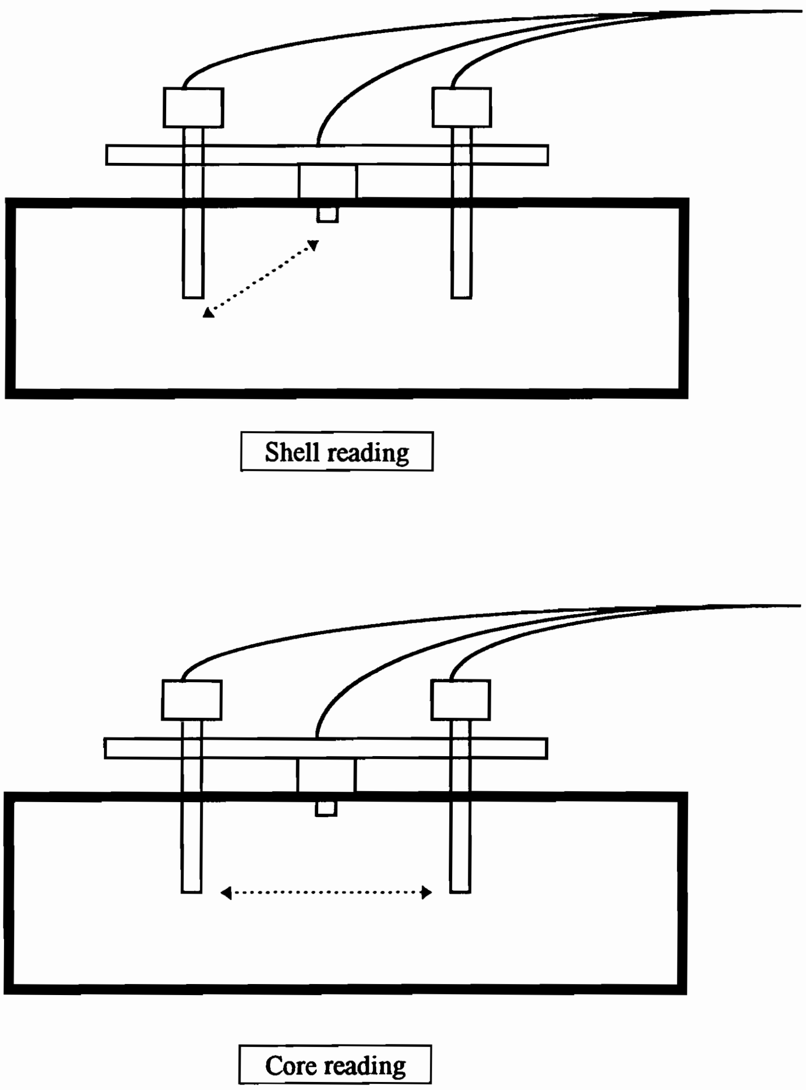

Figure 4. Diagrams of pin groups installed in sample blocks. *Top.* The dashed line indicates the resistance measurement used to estimate shell moisture content. *Bottom.* The dashed line indicates the resistance measurement used to estimate core moisture content.

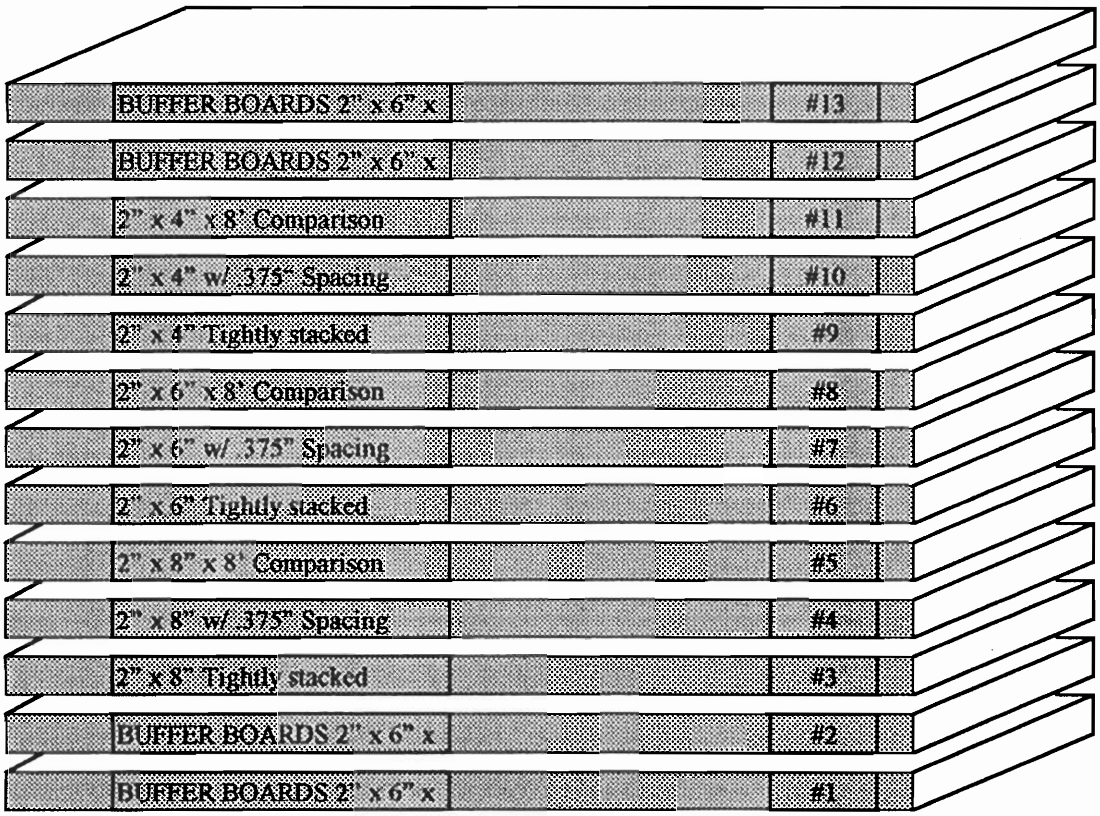

Figure 5. Diagram of charge course configuration for the Geometric Drying Properties phase.

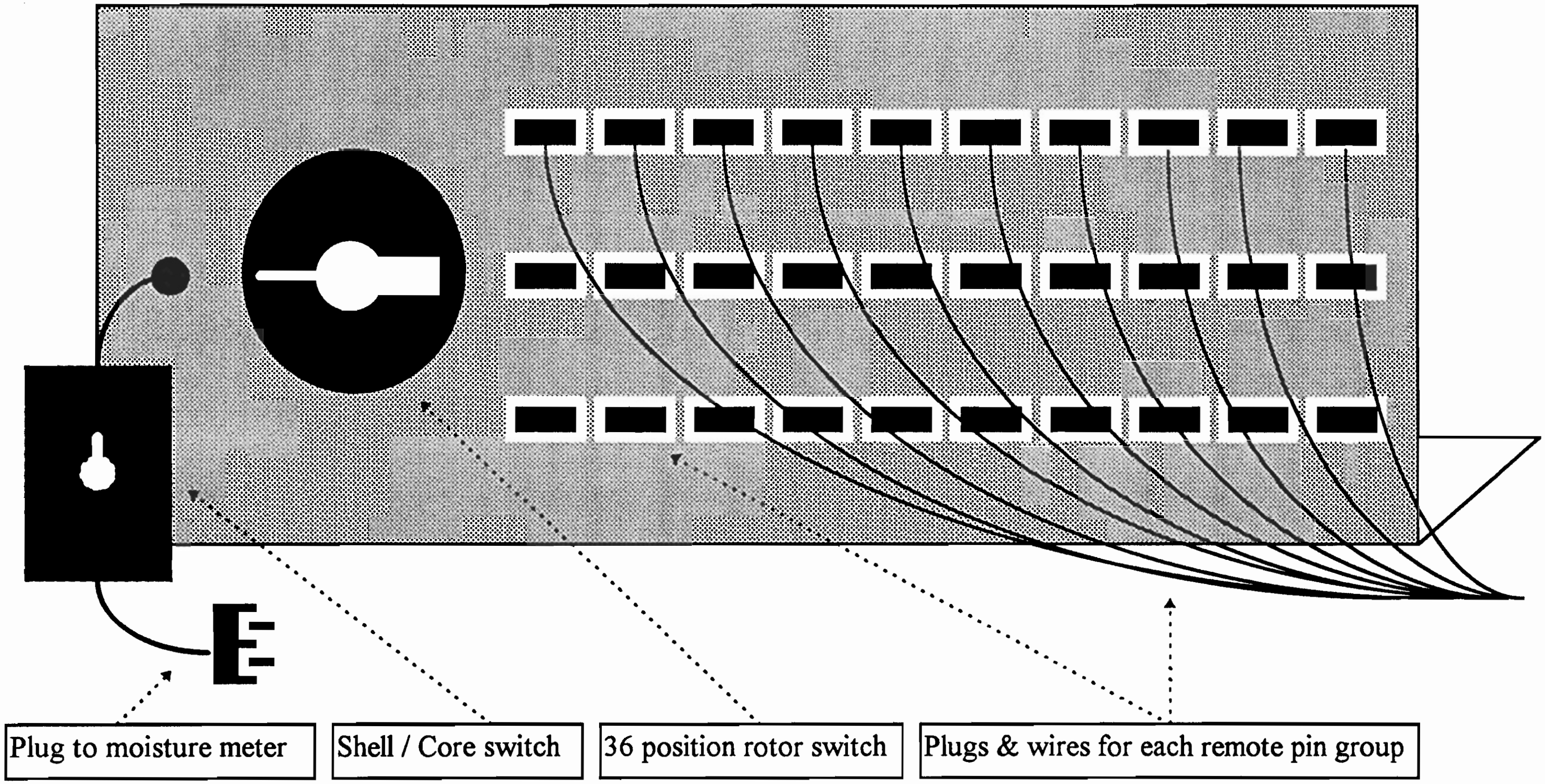

Figure 6. Remote electrical resistance moisture content pin group monitoring management system diagram.

IV.2.3 Drying

Each charge was dried in an eight foot long kiln at the Forest Research Laboratory, Oregon State University. Two charges were dried using the United States Department of Agriculture (USDA) schedule for high-grade dimension Douglas-fir while the remaining two charges were dried using the USDA schedule for low grade Douglas-fir (Tables 3 and 4) (4). Charges one, two three and four where subjected to high-grade, low-grade, low-grade then high-grade schedules respectively. In all cases the fan direction was reversed every six hours. Lacking a programmable data recorder, every attempt was made to take moisture meter readings every 6-8 hours.

At the conclusion of each kiln run, blocks were removed, weighed and qualitatively examined for defects before being oven dried. Samples were then placed in a drying oven set at 225° F until the weight of several of larger blocks had become constant over a twelve-hour period. At this point the samples were considered oven-dry and removed. The dried blocks were then weighed a third time in order to back calculate beginning and ending moisture contents on a dry basis.

Table 3. USDA recommended kiln schedule for high grade Douglas-fir (4).

		Temperature		Equilibrium	
Step	Time	Dry bulb	Wet bulb	moisture content	Relative Humidity
	h	----------*°F*----------		----------*pct*----------	
1	0 to 12	170	164	14.1	86
2	12 to 24	170	160	11.4	78
3	24 to 48	175	160	9.1	69
4	48 to 72	180	160	7.7	62
5	72 to 96	180	140	4.5	36

Table 4. USDA recommended kiln schedule for low grade Douglas-fir (4).

Step	Time	Temperature Dry bulb	Wet bulb	Equilibrium moisture content	Relative Humidity
	h	----------*°F*----------		----------*pct*----------	
1	0 to 12	180	170	11.2	79
2	12 to 36	180	165	9.1	70
3	36 to 60	180	155	6.5	54
4	60 to 84	180	145	5.0	41

IV.3 Charge Formation Schemes

The second series of experiments was designed to test the feasibility of using the aluminum rack system and the wire mesh box for drying actual mill trim-waste from Swanson Superior. These trim-ends were nominal two inches thick, four and six inches wide and quantified in the same manner described previously with the addition of a length measurement since it was uncontrolled experimentally. Equal board footage of four and six inch material were utilized for each charge in this phase. Trim-ends were removed in succession from the top of their respective pallet to fill the appropriately sized rack. The wire mesh box was loaded by alternating samples from four and six inch stock which resulted in a charge that had each width distributed throughout the load.

4.3.1 Aluminum Racks

Samples were then loaded into the racks. Thirty-two sets of moisture meter probes were randomly assigned to blocks, eight within each layer. The order of the layers was the same as in the first set of experiments except that no courses of eight-inch wide material were utilized. Two charges of mill waste were dried in this manner according to the USDA schedule for low grade Douglas-fir.

At the conclusion of each kiln run, sample blocks were removed, weighed and qualitatively examined for defect before being oven dried. Samples were then placed in a drying oven set at 225° F until the weight of several of larger blocks had become constant over a twelve hour period. At this point the samples were considered oven-dry and removed. The dried blocks were then weighed a third time in order to back calculate beginning and ending moisture contents on a dry basis.

IV.3.2 The Wire Mesh Box

The final experiment employed the four-foot square box whose sides perpendicular to the airflow direction were constructed of wire mesh. Again, actual mill waste was the material tested. Blocks were randomly tossed into the bin to simulate possible mechanical loading at the manufacturing site. Thirty sets of moisture meter probes were placed in blocks which were randomly distributed within the pile. This charge was baffled and then dried per USDA low grade Douglas-fir schedule (4). Baffling is the placing of barriers around the edges of a kiln charge to force the air flow through the lumber exclusively.

At the conclusion of the box kiln-run sample blocks were removed, weighed and qualitatively examined for defect before being oven dried. Samples were then placed in a drying oven set at 225° F until the weight of several of larger blocks had become constant over a twelve hour period. At this point the samples were considered oven-dry and removed. The dried blocks were then weighed a third time in order to back calculate beginning and ending moisture contents on a dry basis.

IV.4 Calculations

IV.4.1 Moisture Content

Moisture contents are represented on a dry basis through this document, as is common practice within the forest products industry for solid lumber according to the following equation.

$$\frac{(W_i - W_f)}{W_f} \times 100 = MC_d$$

Where:

W_i = Initial weight
W_f = Oven-dry weight
MC_d = Moisture content, dry basis

The dry basis expresses moisture content as the ratio of water to wood. It is therefore possible to have moisture contents in excess of 100 percent. For example, a board which contains 1.5 kg of water and 1.0 kg of wood has a dry basis moisture content of 150 percent.

IV.4.2 Data Normalization

Final moisture content for each sample included in the Geometric Drying Properties phase were converted to a normalized ratio for further analysis across all charges. An additional value was assigned to each block that expressed the final moisture content as a percentage of the mean moisture content of its parent board. Recall that one sample of each examined length was cut from each parent board (total of six). The procedure is illustrated below.

$$\frac{MC_f}{MC_{avg}} \times 100 = N$$

Where:

MC_f = Final moisture content of sample block
MC_{avg} = Average moisture content of all sample blocks from parent board
N = Normalized final moisture content

IV.4.3 Statistical Treatment

To test the statistical significance of the data, the SAS system for Windows 3.1 was employed. A one-way analysis of variance (ANOVA) was used to test for differences in wood characteristics between charges in each of the two phases of the experiment. The effects of length, width and spacing of sample blocks in each charge of the Geometric Drying Properties phase were analyzed using a three-way general liner model instead of a three-way analysis of variance since the cell sizes of the data set were not equal. An ANOVA was also used to analysis final moisture content differences in the Charge Formation Schemes phase of the experiment.

Significantly different means were determined and categorized using Tukey's Studentized Range Test. Means were assigned a letter indicating their similarity to other means. Means that share the same letter designation are not significantly different. For example, if three means are categorized as A, B and B then number one is different from two and three. While two and three are different from one they are not significantly different from one another. A mean may be assigned more than one letter.

V. RESULTS AND DISCUSSION

V.1 Geometric Drying Properties

V.1.1 Wood Characteristics

General statistics were run on the 953 individual sample pieces resulting from the four Geometric Drying Properties phase charges to determine the overall characteristics of the wood utilized in all four charges (Table 5). A listing of the complete data set for the Geometric Drying Properties phase is provided in Appendix A.

Table 5. Class variable general statistics summary for the Geometric Drying Properties phase.

Variable	Mean	Std. Dev.	Minimum	Maximum
PITH DISTANCE	2.23	1.67	0.00	10.00
RING COUNT	5.4	2.3	2.0	19.0
HEARTWOOD %	61	34	0.0	100.0
START MC	49.4	27.6	18.3	169.3

An analysis of variance performed using charge groupings as the dependent variable showed significant differences at the 95 percent confidence level among all class variables shown in Table 5.

The mean estimated distance from the pith in charge three (3) was found to be significantly different from charges one (1) and two (2) (Table 6).

Table 6. Mean distance from pith, standard deviation and Tukey grouping by charge.

Charge	Mean	Std. Dev.	Tukey Group
1	2.02	1.39	A
2	2.03	1.48	A
3	2.54	1.87	B
4	2.30	1.79	A-B

Keeping in mind that charges one (1) and two (2) were formed from lumber acquired separately from that which formed charges three (3) and four (4) it can be seen that the second load has a slightly higher mean distance from the pith. This could be due to a larger log size used to produce the second load therefore increasing the likelihood that a board could be cut from a point further from the center of the log. It could also be inferred that larger log size would lead to a higher percent occurrence of heartwood and therefore a lower average beginning moisture content.

An analysis of variance on mean rings per inch grouped charges one (1) and three (3) as well as charges two (2) and four(4) together as having similar means (Table 7).

Table 7. Mean ring per inch, standard deviation and Tukey grouping by charge.

Charge	Mean	Std. Dev.	Tukey Group
1	5.9	2.4	A
2	5.2	1.6	B
3	6.1	2.6	A
4	4.7	2.1	B

The presence of significant differences among charges formed from different lumber shipments can be explained by the high variability in ring count due to growth conditions. Any given log, regardless of size or age can have its ring count affected by, but not limited to, site quality, spacing, fertilization, lean or crown damage.

The analysis of variance among charges for heartwood-content grouped charges two (2), three (3) and four (4) separate from one (1) which stood as an unique group. Charges three (3) and four (4) were not significantly different and while charge two (2) was grouped with three (3) it was significantly different from four (4) (Table 8).

Table 8. Mean heartwood percentage, standard deviation and Tukey grouping by charge.

Charge	Mean	Std. Dev.	Tukey Group
1	47	36	A
2	68	35	B
3	66	30	B-C
4	71	32	C

If log size was indeed larger for the second load of lumber it could explain the tendency for the third and fourth charge to have a higher mean average heartwood. Large logs will contain a greater volume of heartwood relative to sapwood than small logs, therefore increasing the heartwood component in sawn lumber.

One of the most important factors relative to the final moisture content of kiln dried wood is its initial moisture content. An analysis of variance procedure applied to the data showed that charge one (1) and three (3) were not significantly different while charge two (2) and four (4) stood apart from any of the other three respective charges (see Table 9).

Table 9. Mean initial moisture content, standard deviation and Tukey grouping by charge.

Charge	Mean	Std. Dev.	Tukey Group
1	59.3	28.4	A
2	35.2	17.7	B
3	56.3	29.8	A
4	46.5	26.2	C

Charges one (1) and three (3) were both composed of fresh lumber which was processed on the day it was shipped from the mill. The lumber for charges two (2) and four (4) was stored for one week prior to processing. Though the wood was tarped and kept shaded it was not refrigerated or frozen so moisture loss was inevitable. Weather differences between storage times is the likely explanation for the lower moisture content of charge two (2) relative to charge four (4). A mass of wood which is left to approach a lower equilibrium moisture content than its current average will exhibit a decline in deviation between pieces. As the lumber for charge two (2) was subject to hotter, drier weather than charge four (4) and likely lost a greater percentage of its initial moisture content at production it can be expected to exhibit a lower standard deviation.

Primarily due to the moisture content differences between charges and the differing kiln schedules employed between charges of similar initial moisture content, the effect of piece length, width and spacing were examined on an individual charge basis. Additionally, piece final moisture content was normalized by expressing the data as a percentage of its initial moisture content in order to make the influence of geometry more apparent.

V.1.2 Length Effect

The difference in final moisture content among sample lengths was statistically different for every charge; however, the differentiated groups were those on the extremes of the length range. For charges one (1) and four (4) the difference was limited to the 0.5 foot samples. Charges two (2) and three (3) had different mean end moisture contents for 0.5 and 8.0 foot samples. In all cases, the difference was for all measured lengths. To illustrate, the 0.5 foot sample-length mean final moisture content was statistically different from all other sample lengths for all four charges. The 8.0 foot boards in charges two (2) and three (3) also had statistically different mean final moisture contents from all other sample lengths in their respective groups. Final moisture content graphs by length for each charge are presented in Figures 7-10. Statistical output relating to each charge can be found in Appendix B.

Due to the asymptotic nature of the drying rate of wood as it approaches an equilibrium moisture content, it can be expected that the variation among lengths (and pieces in general) will be reduced as the wood gets drier. The 6-12 percent moisture content to which the experimental charges were dried could be expected to dampen observable variation due to length. These conditions are somewhat similar to those desired for finger-jointing so these observations should provide some practical insight. Increased moisture content variability due to varied piece length could be small enough that extra sorting may not be necessary.

The fact that the 8.0 foot comparison boards tested significantly different only in charges two (2) and three (3) brings to light the possible effect of the differing kiln schedules. It can be expected that the substantially longer length of the 8.0 foot boards would reduce their drying rate compared to that of the shorter blocks yet it was only manifested in two charges. Recall that charges two (2) and three (3) were subjected to the USDA Douglas-fir low-grade schedule while charges (1) and four (4) were dried with the USDA Douglas-fir high-grade schedule. Charge two (2) was stored for one week in the warmer of the two storage periods, therefore having a relatively low average initial moisture content, while charge three (3) was composed of fresh lumber so the aggregate conditions were similar to that of charges (1) and four (4). It would appear that the more severe schedule with its shorter time steps never gave the long lumber a chance to reach a similar moisture content as the shorter blocks. The majority of the

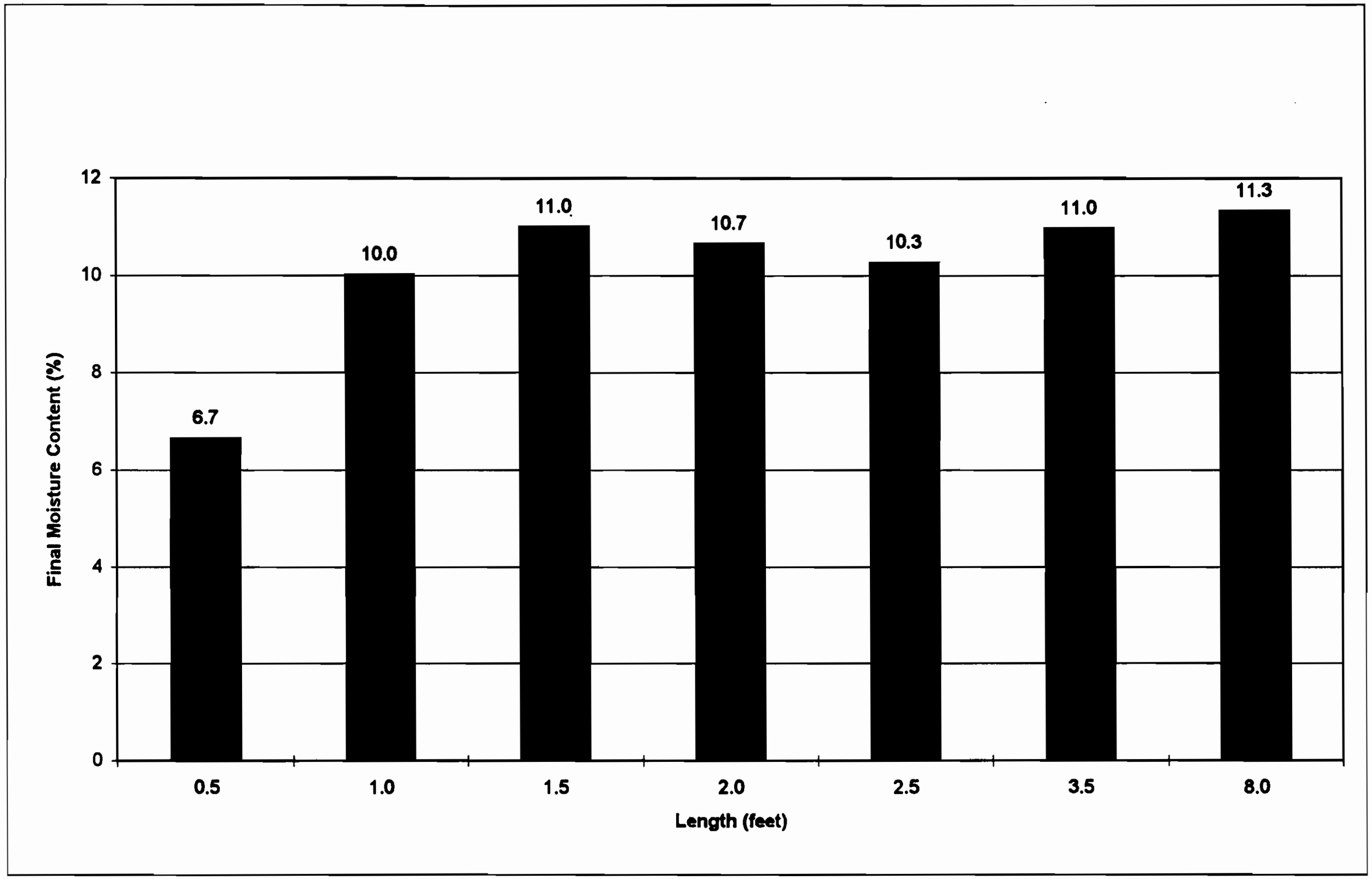

Figure 7. Average final moisture content by length for charge one (1), Geometric Drying Properties phase.

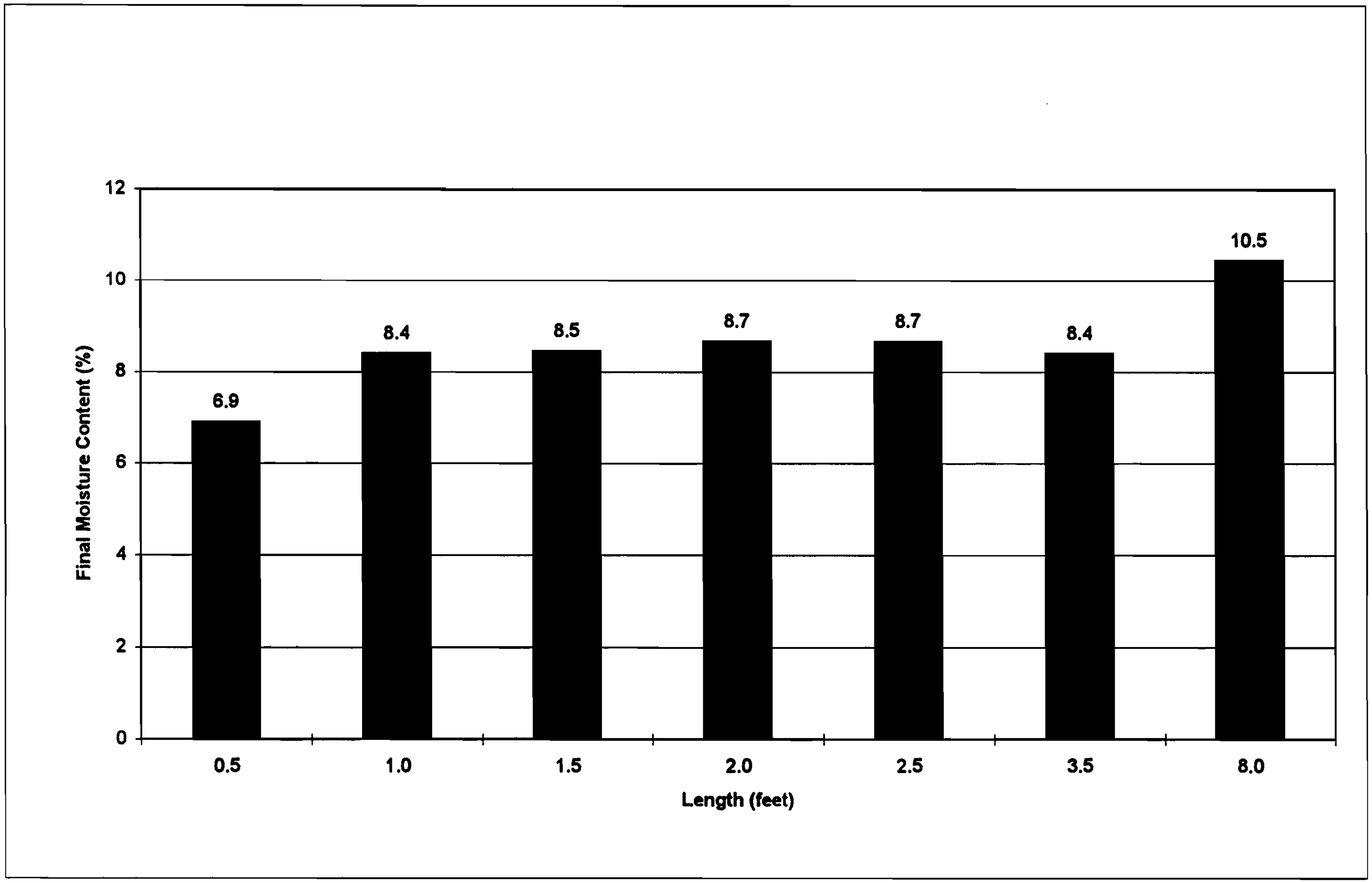

Figure 8. Average final moisture content by length for charge two (2), Geometric Drying Properties phase.

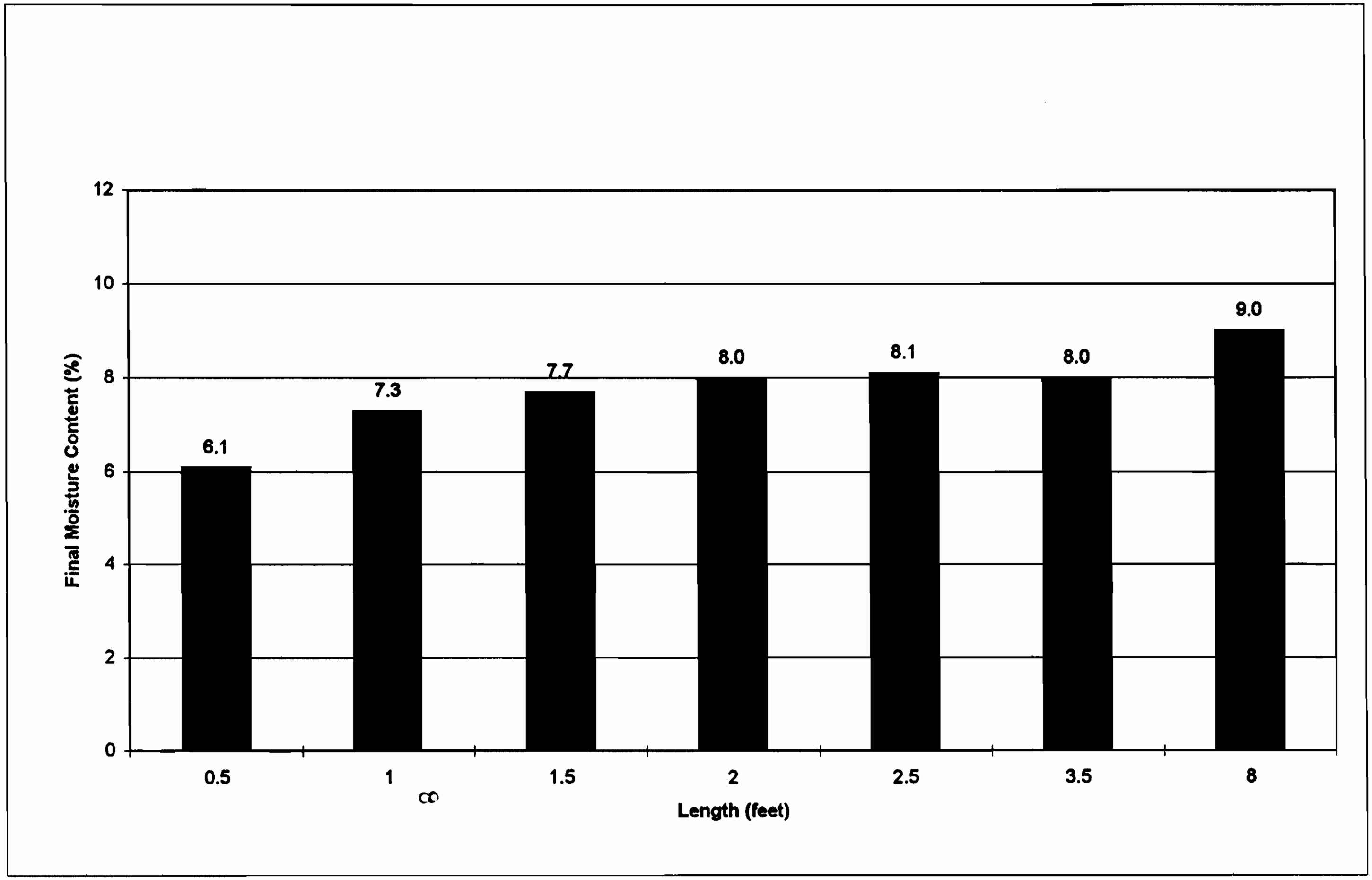

Figure 9. Average final moisture content by length for charge three (3), Geometric Drying Properties phase.

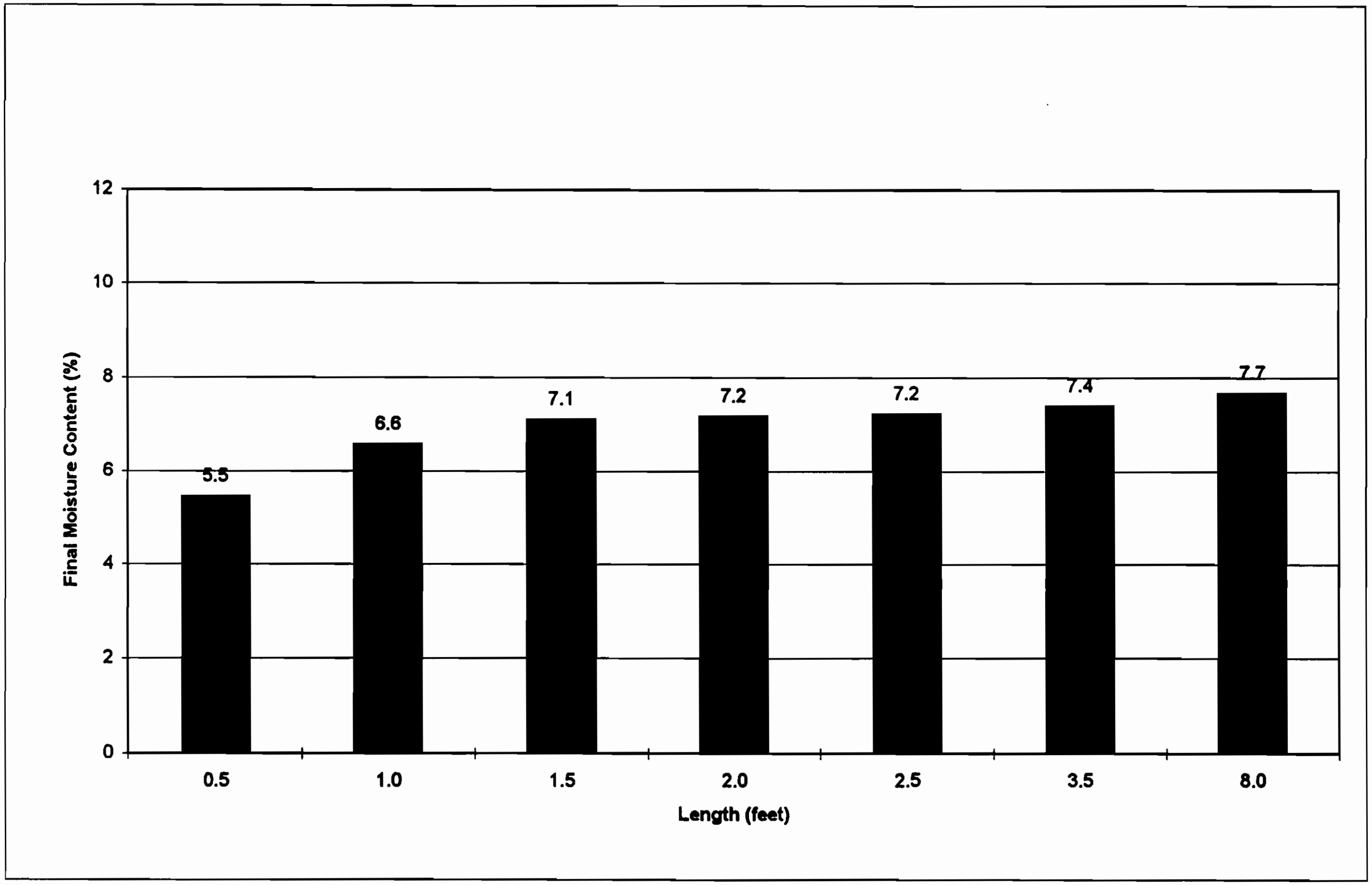

Figure 10. Average final moisture content by length for charge four (4), Geometric Drying Properties phase.

drying rate advantage to short lumber (particularly spaced) is increased ability to move water vapor in the longitudinal direction above fiber saturation point. It is possible that during the high-grade schedule, again because of the asymptotic nature of the drying curve, the short blocks quickly reach a condition of greatly decelerated moisture loss but because the schedule steps were smaller and at a lower temperature, the longer boards were given sufficient time to reach a similar condition before the schedule progressed. It should be noted that the conditions and steps in the schedules employed were developed to dry long lumber of the same species to a functional moisture content with a minimum of deviation. Use of these schedules may lead to the inefficient use of energy when drying short pieces.

V.1.3 Width Effect

Statistical differences in final moisture content were detected between widths for all charges. Six-inch material deviated significantly from both four and eight inch boards in charges one (1) and two (2). Four and eight-inch material expressed differing final moisture contents for charge three (3) while all widths were detected as different in charge four (4) (see Table 10). Final moisture content graphs by width for each charge are presented in Figures 11 to 14. Statistical output relating to each charge can be found in Appendix B.

Table 10. Tukey groupings for sampled widths by charge.

Width	Charge (1)	Charge (2)	Charge (3)	Charge (4)
Four (4) inch	A	A	A	A
Six (6) inch	B	B	A-B	B
Eight (8) inch	A	A	B	C

Eight-inch wide lumber was problematic throughout the experiment. Since the main source mill did not produce lumber of this dimension it was necessary to obtain it from another processing facility. The initial shipment provided was less than planned for which reduced sample size and the lumber was obviously drier than the material from the primary source mill. The second shipment was of adequate quantity and was placed under sprinklers until shipment. Not only was this sample set different in size and initial moisture content but the mill from which it came processes larger logs from different sources relative to the mill providing the smaller material. This created a situation were the comparison across all three represented widths is unlikely to lead to useful or accurate conclusions regarding the effect of width on final moisture content.

Final moisture content differences between four-inch and six-inch wide lumber in charges one (1) and two (2) exhibited the expected pattern of narrower pieces drying the fastest. The pattern was not repeated in charges (3) and four (4) although the final average moisture contents of these charges, particularly relative to charge one (1), were extremely dry. Closer examination suggests that the high initial moisture content of the six-inch pieces relative to the four-inch group is likely the primary cause of the expressed difference. This moisture content relationship was inverted in charges three

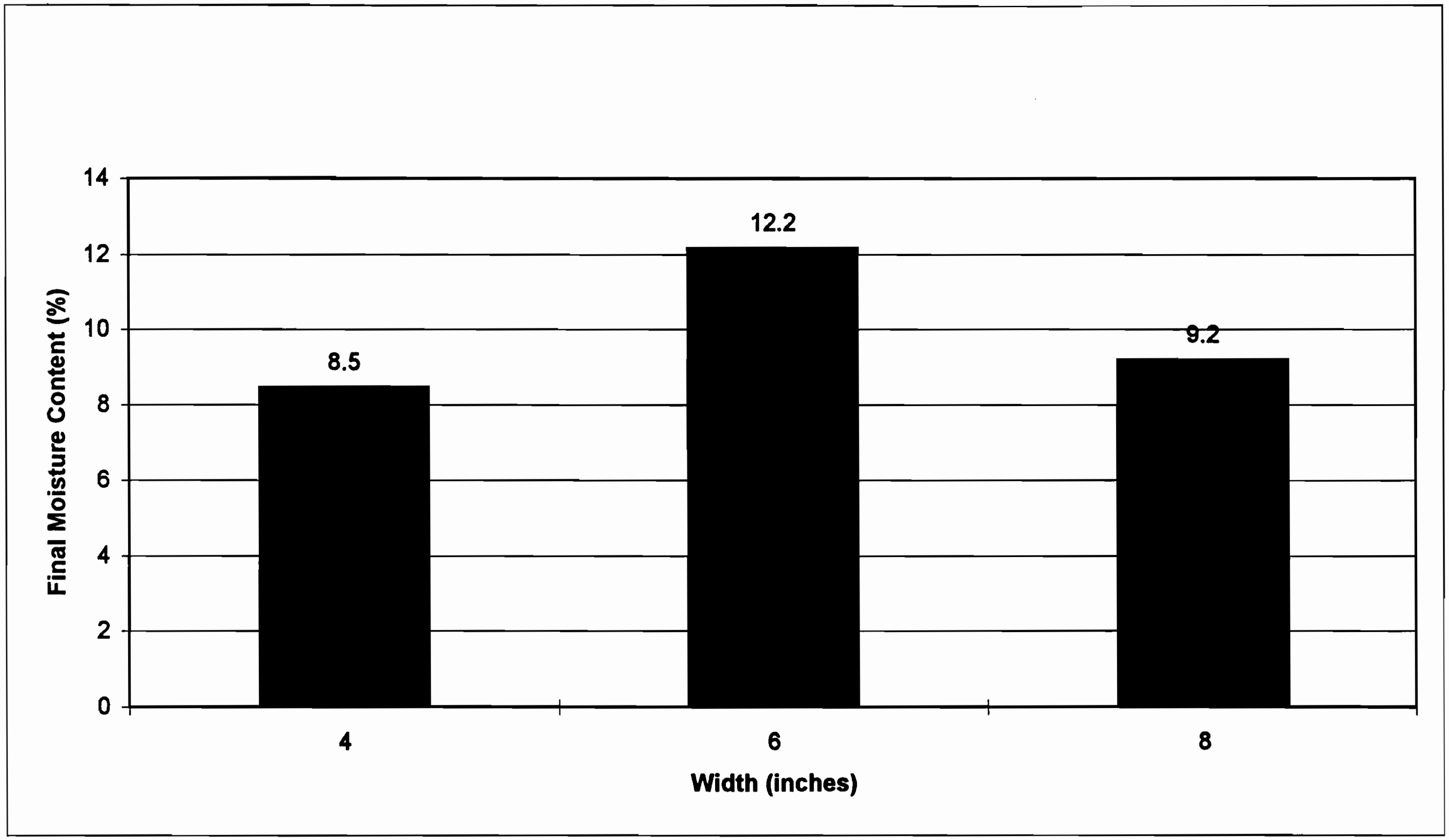

Figure 11. Average final moisture content by width for charge one (1), Geometric Drying Properties phase.

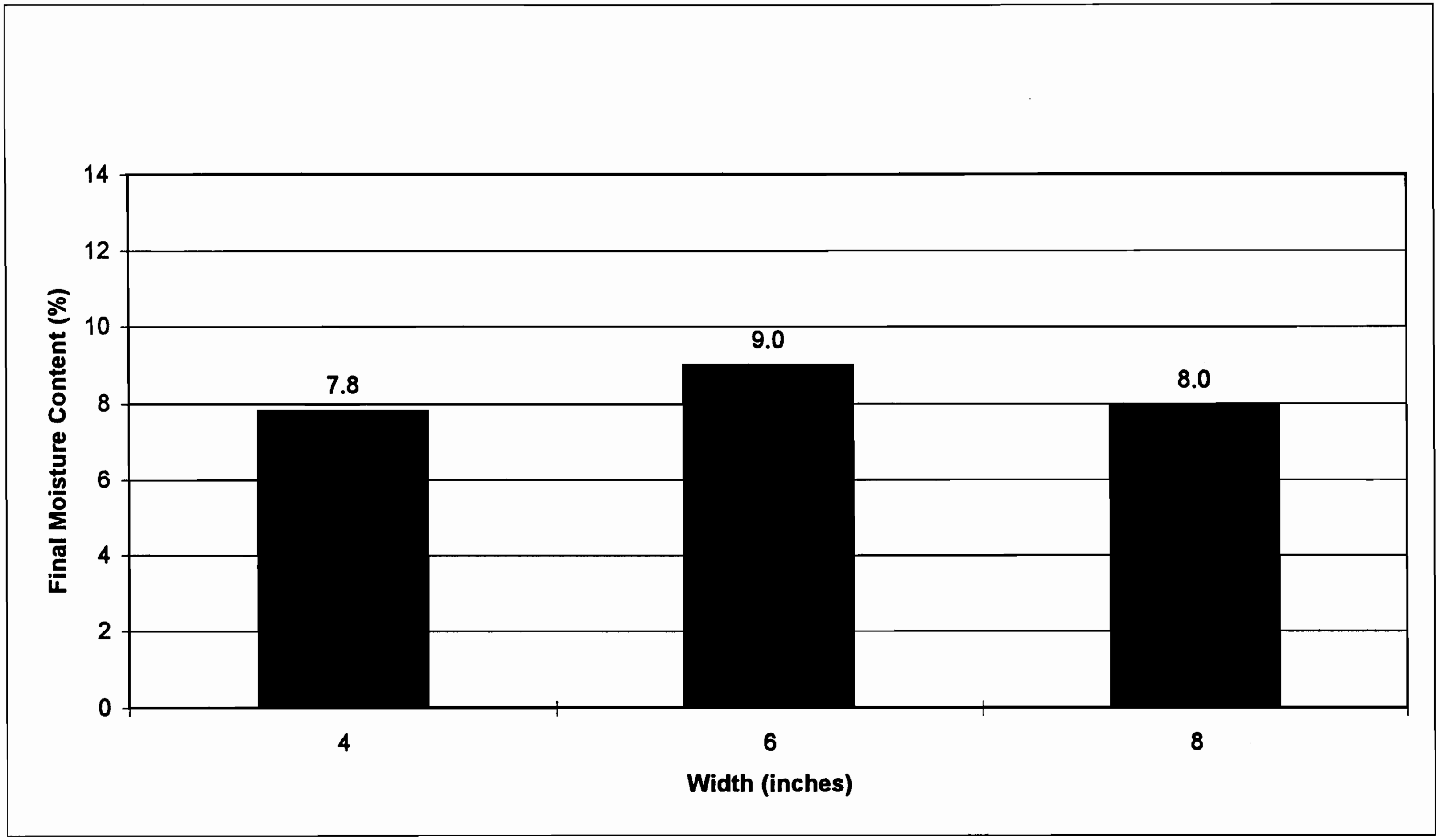

Figure 12. Average final moisture content by width for charge two (2), Geometric Drying Properties phase.

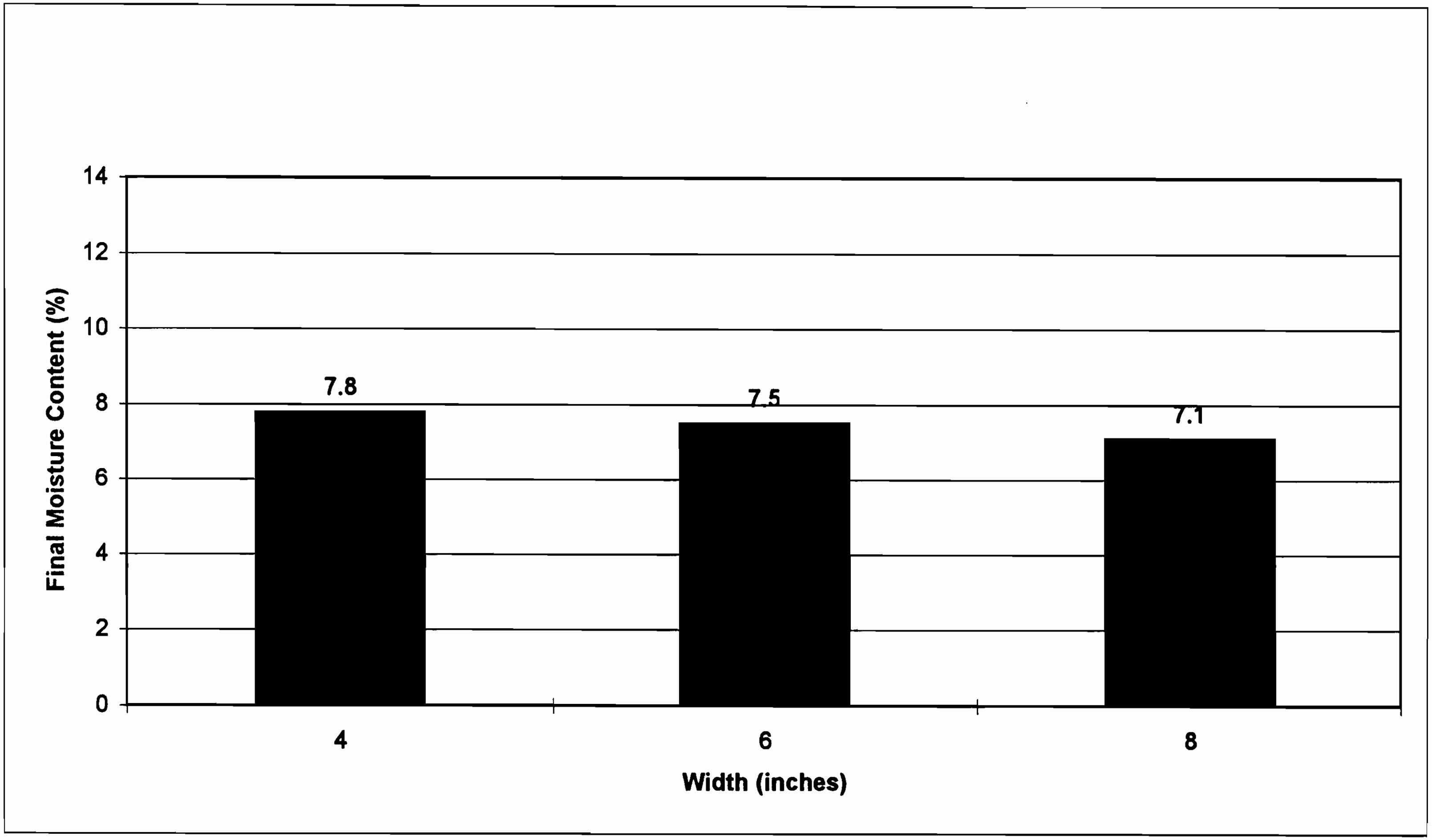

Figure 13. Average final moisture content by width for charge three (3), Geometric Drying Properties phase.

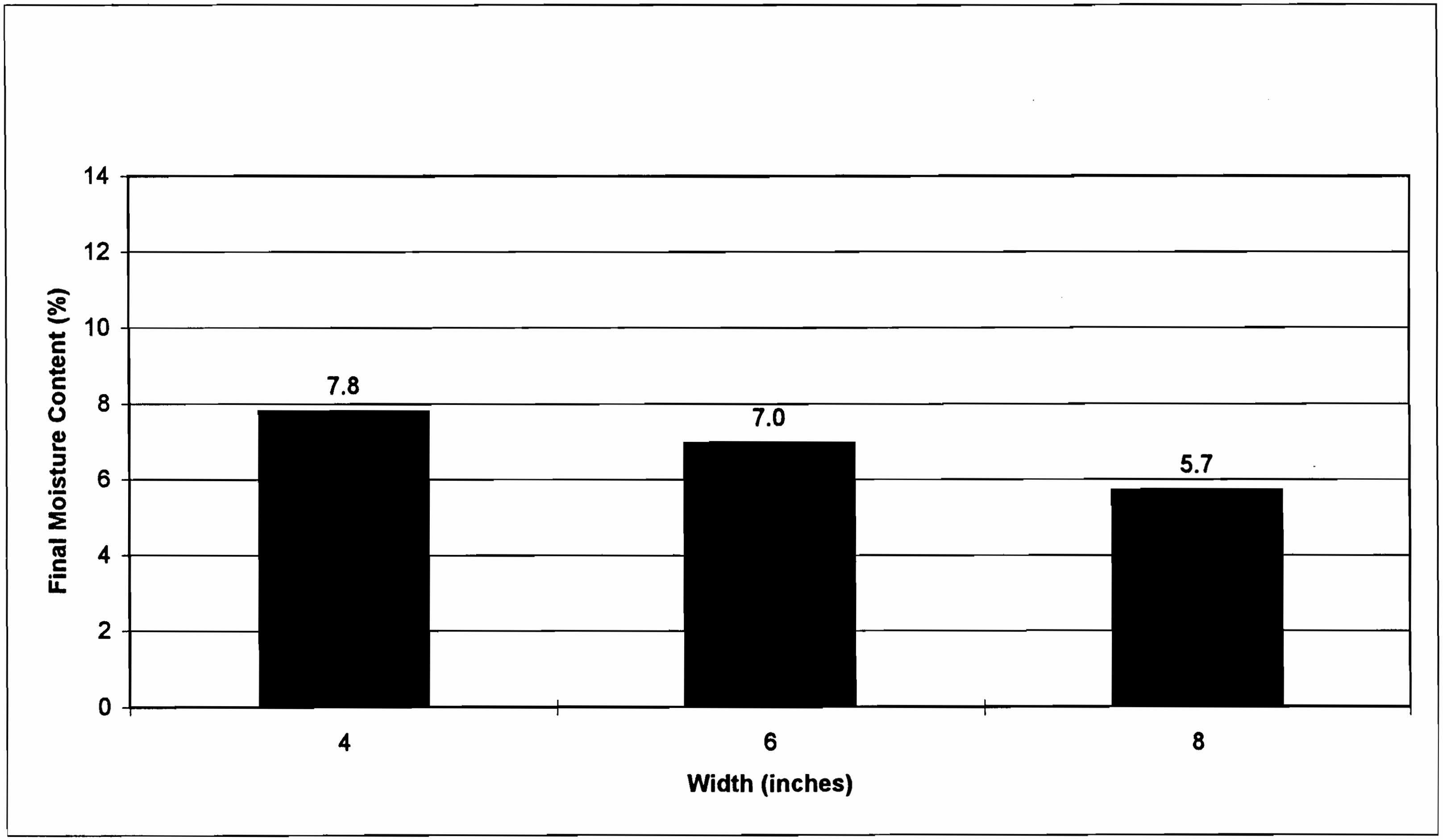

Figure 14. Average final moisture content by width for charge four (4), Geometric Drying Properties phase.

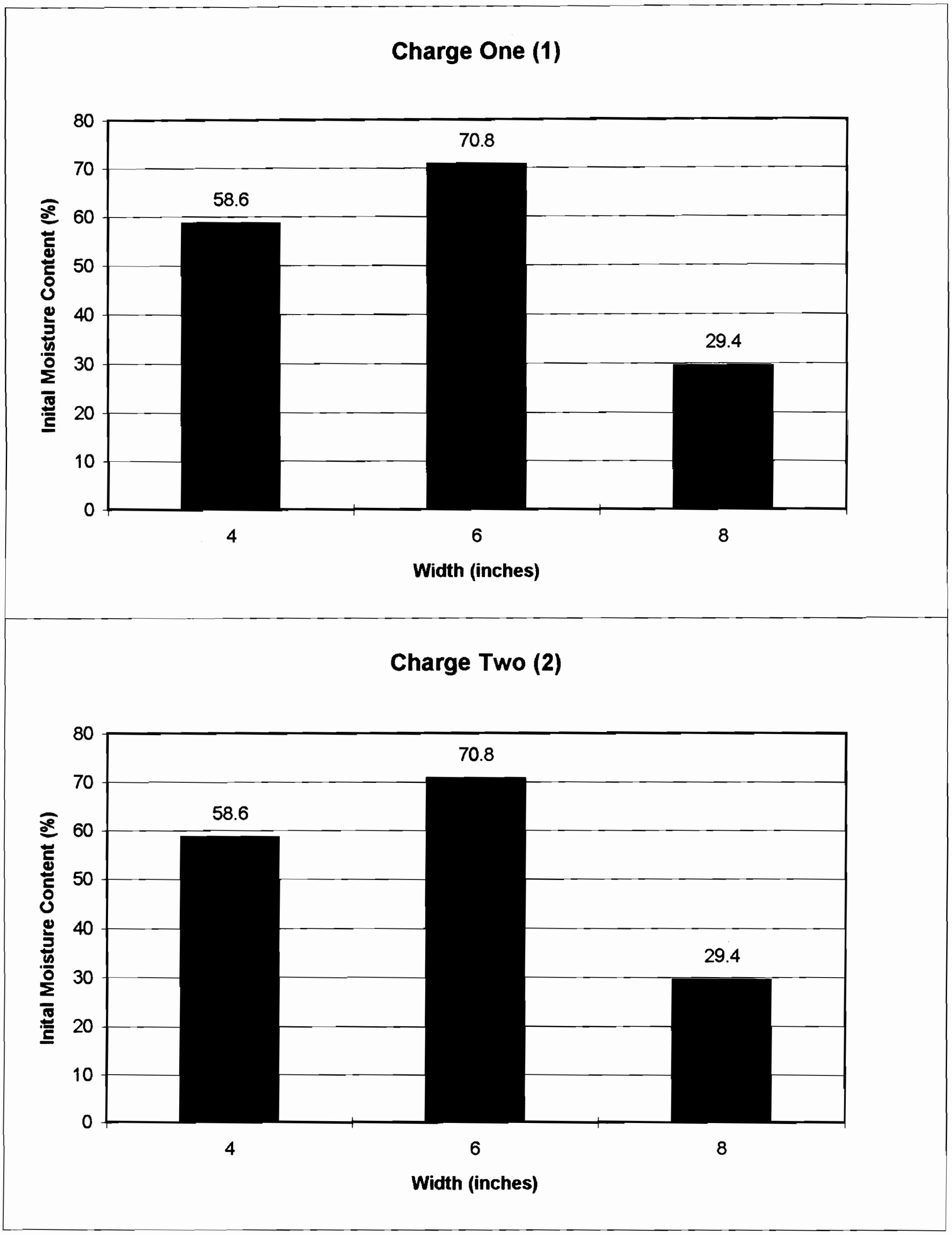

Figure 15. Initial average moisture content for Geometric Drying Properties phase charge one (1), *top*, and charge two (2), *bottom*, by width.

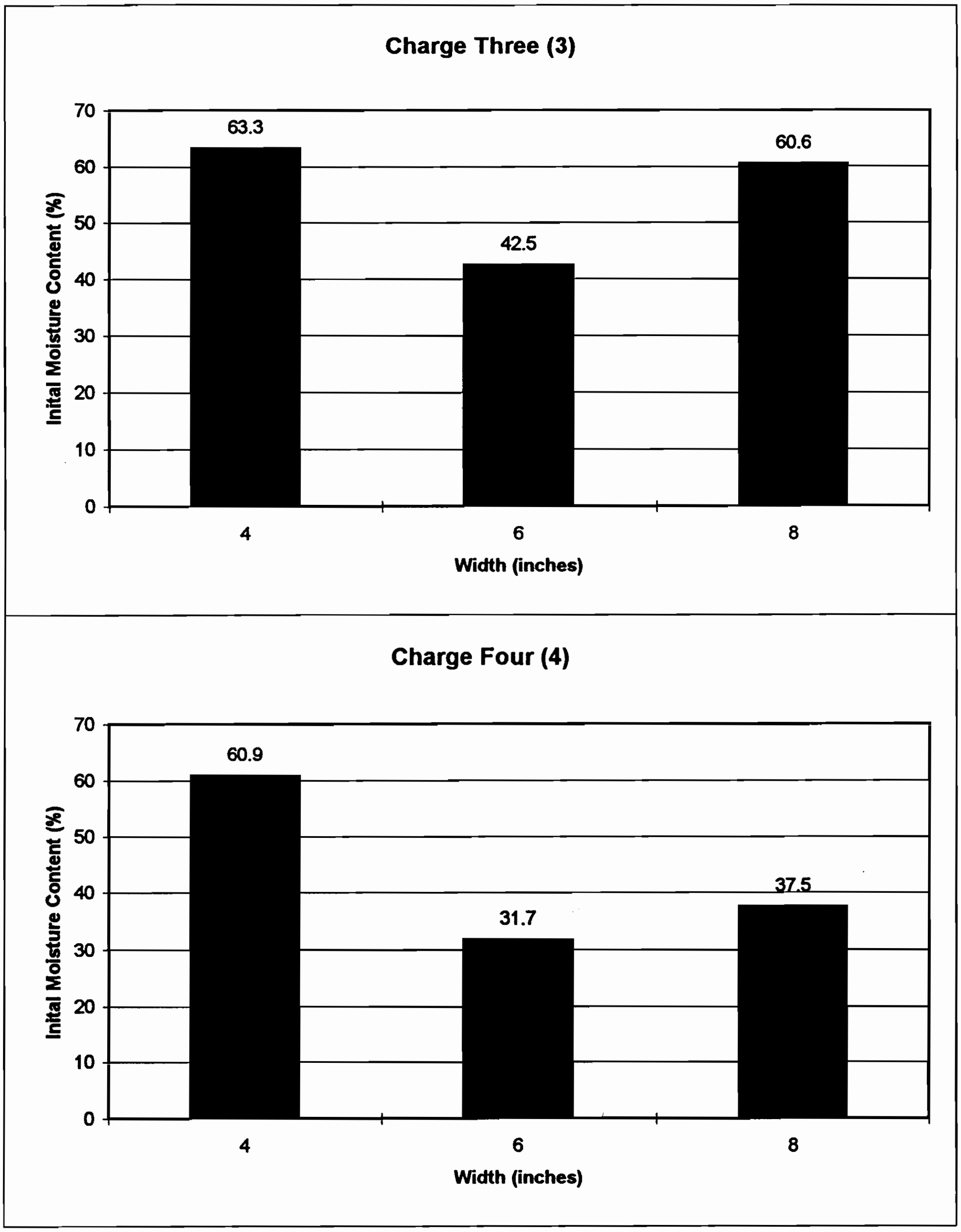

Figure 16. Initial average moisture content for Geometric Drying Properties phase charge three (3), *top*, and charge four (4), *bottom*, by width.

(3) and four (4) and, as would be expected, the final moisture content relationship was also reversed. Initial moisture content graphs are provided in Figures 15 and 16. Note the pattern similarity for each charge with its respective final moisture content chart (Figures 11 to 14). This suggests that the current practice of sorting lumber by width for drying is perhaps less important than sorting by initial moisture content.

V.1.4 Spacing Effect

Block spacing was a statistically significant effect for charges one (1) and three (3) only (see Table 11). Graphs of average final moisture content relative to spacing are presented in Figures 17 and 18.

Table 11. Tukey groupings for spacing treatments by charge.

Width	Charge (1)	Charge (2)	Charge (3)	Charge (4)
Spaced	A	A	A	A
No space	B	A	B	A

Charges one (1) and three (3) were subjected to different drying schedules. They were similar in that they were both composed of fresh lumber on the day it was shipped from the mill. The primary drying advantage imparted by the relatively short longitudinal path of the sample block is an increased ability to allow for the escape of water contained in the pore spaces of the wood. The spaces between blocks were intended to help facilitate this longitudinal movement. Drying rates are higher above the

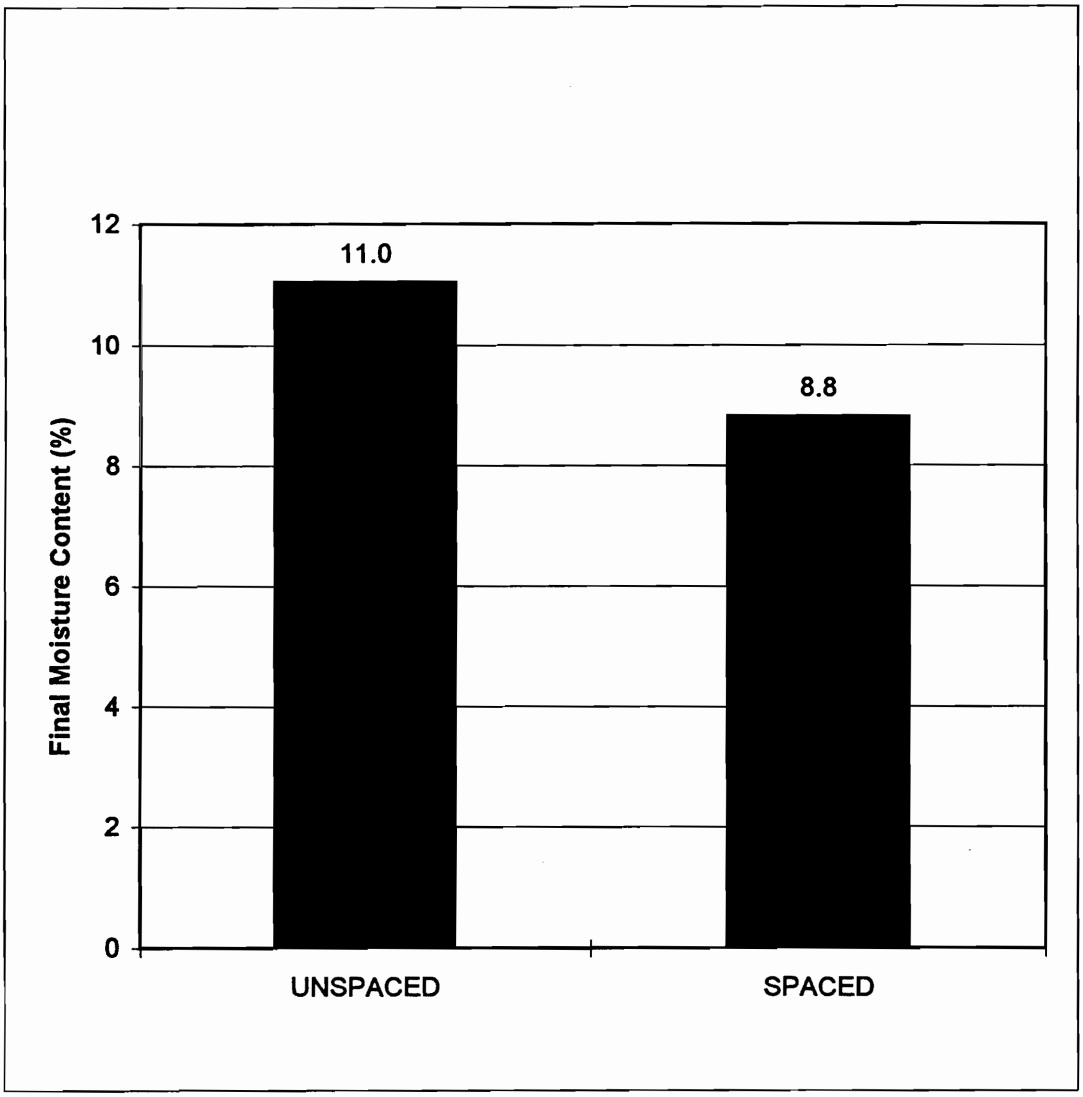

Figure 17. Average final moisture content of spaced versus unspaced sample blocks for Geometric Drying Properties phase, charge one (1).

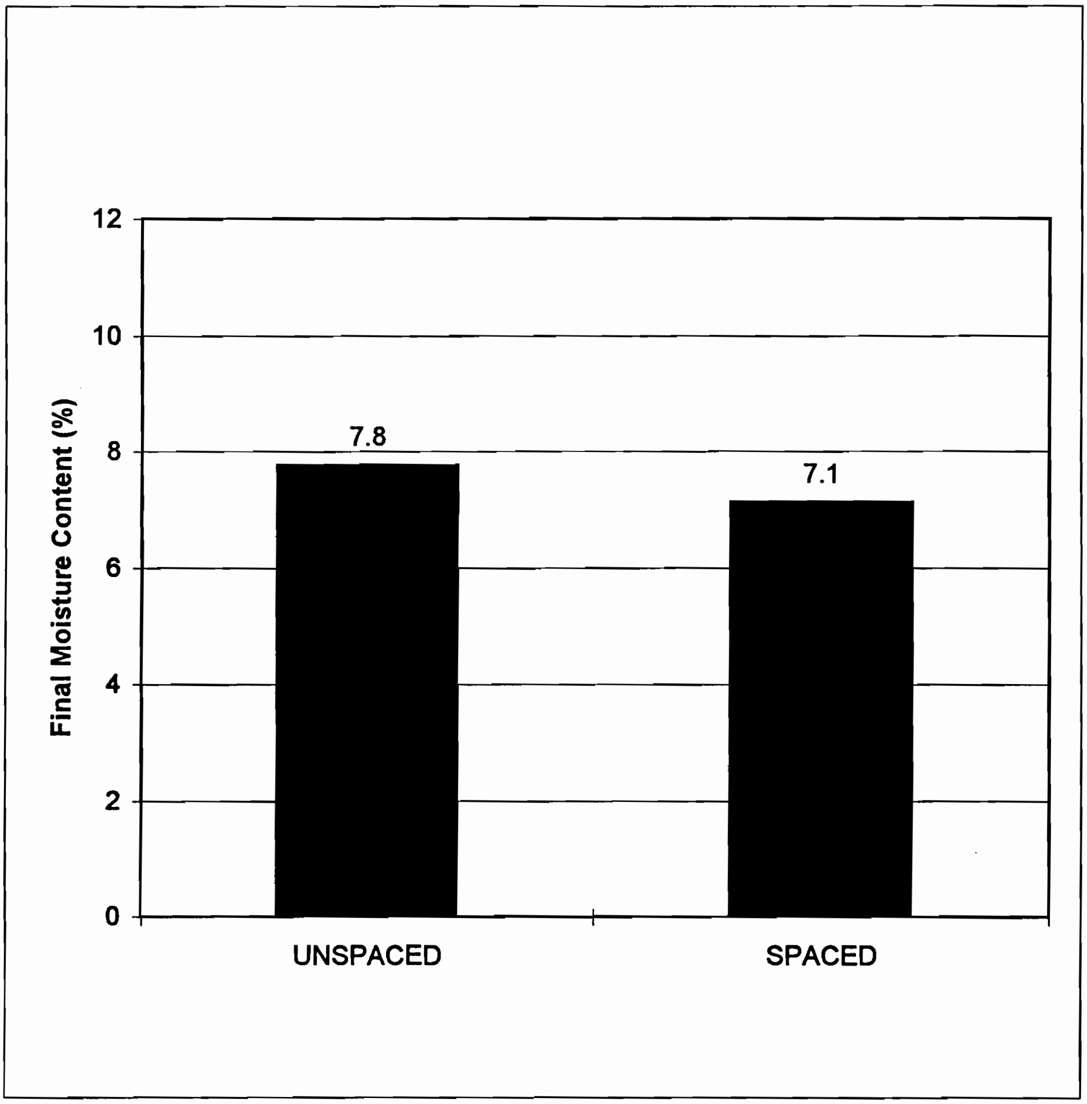

Figure 18. Average final moisture content of spaced versus unspaced sample blocks for Geometric Drying Properties phase, charge three (3).

fiber saturation point as it takes less energy to remove free water relative to bound water. Therefore, charges one (1) and three (3) spent more drying time above the fiber saturation point relative to charges two (2) and four (4) due to the higher initial moisture content they exhibited. This could have given the spaced blocks a drying rate advantage within charges one (1) and three (3) that was not detected for charges (2) and four (4).

V.1.5 Normalized Analysis

Expression of the average final moisture content of a sample block as a percentage of the mean final moisture content of all blocks originating from its sample board changed the results of the analysis of variance significantly. This analysis necessitated the omission of the 8.0 foot comparison boards since the average final moisture content of the block divided by that of the sample board would always be 1.00. Where detected differences were limited to 0.5 foot samples in the unnormalized analysis (again, excluding 8.0 foot samples), the normalized data showed 0.5 and 1.0 foot samples as being each unique from all other sample lengths. Additionally, the 1.5 foot sample mean was statistically different from that of the 3.5 foot samples. A graphical display of normalized means by length is presented in Figure 19. Statistical output relating to the normalized data set can be found in Appendix B.

Combining all 851 samples across all four charges in this manner, length was the only significant effect presented; width and spacing were no longer a factor. This reflects that the previously observed width effects was due to differences in initial

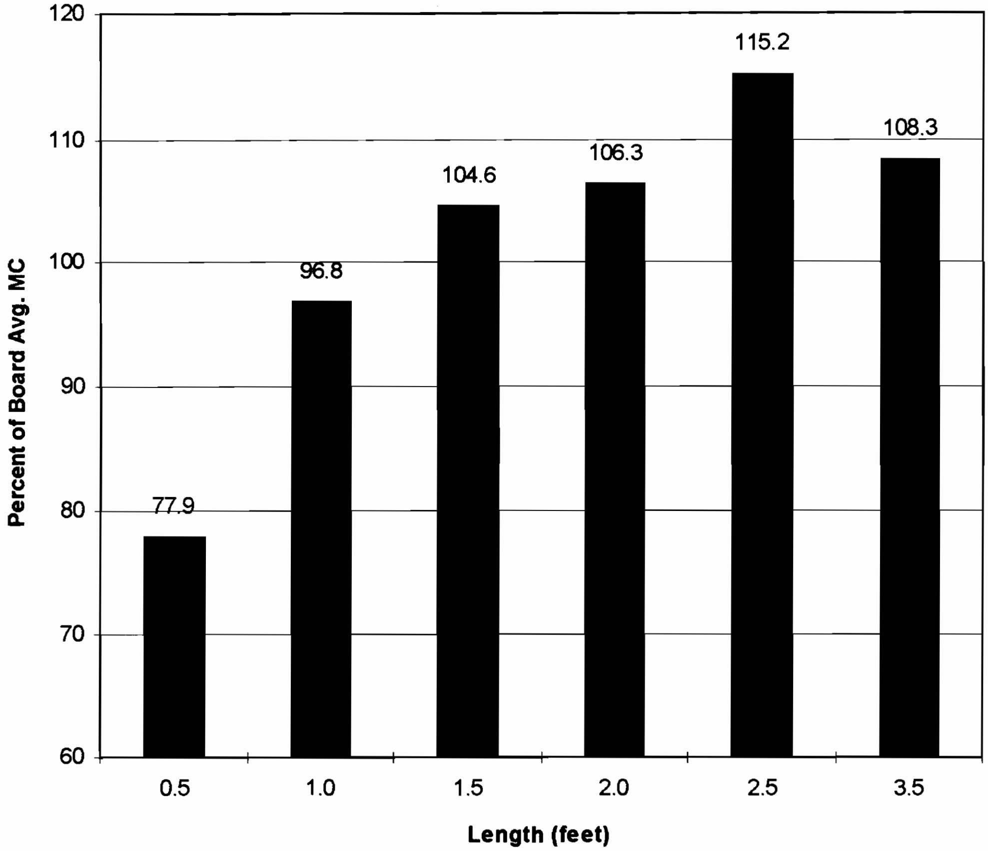

Figure 19. Normalized average final moisture content by length expressed as a percentage of the mean final moisture content of all blocks removed from a sample board. Data set spans all four Geometric Drying Properties phase charges.

moisture content, an influence removed by this data analysis method. Spacing effect was undetectable as well since blocks from each individual sample board were either all spaced or all tight. Dividing the final moisture content of each block by the average of its sample group does not lend to the expression of drying differences between lengths due to spacing.

Since blocks were compared to the entire sample board from which they originated, this analysis shows clearly the influence of the length of the longitudinal path on the final average moisture content. Though it demonstrates that shorter boards can be drier boards it is important to remember that a typical charge of lumber is not composed of normalized lumber. Wood character varies widely in a typical production situation and these differences may be a more significant affect on the final moisture content of a given piece.

V.1.6 Resistance Meter Pin Probes

Difficulties and limitations were encountered with the use of the resistance type moisture meter such that no reliable real-time data was produced concerning drying rates relative to the length, width or spacing of blocks. The inability of resistance type meters to detect moisture content accurately above the fiber saturation point where drying rate differences relative to length and spacing were likely to be most apparent was the primary cause. Regardless, the number of variables being examined in each charge with limited hardware severely reduced the usefulness of the sample size. Within any given width, there was only one monitored sample for each length and spacing combination. Due to the lack of hardware, one kiln rack was excluded from sampling in each charge. The lack of a meter unit that could also act as a data recorder limited the frequency of data collection as well.

The meter did perform well below 20 percent moisture content and was useful in determining when a particular charge was dry. It also provide some useful data concerning the standard deviation of charges at points below 20 percent yet above their final moisture content. This data will be discussed along with the practical application phase of the experiment.

V.2 Charge Formation Schemes

V.2.1 Wood Characteristics

General statistics were run on the 633 individual sample pieces resulting from the Charge Formation Schemes phase to determine the overall characteristics of the wood utilized. The results are summarized in Table 12. A listing of the complete data set for the Charge Formation Schemes phase is provided in Appendix A.

Table 12. Class variable general statistics summary for the Charge Formation Schemes phase.

Variable	Mean	Std. Dev.	Minimum	Maximum
LENGTH	20.8	5.3	6.0	24.0
HEARTWOOD %	49.4	38.6	0.0	100.0
START MC	58.6	27.6	21.7	124.0

Analysis of variance and Tukey's Studentized Range Test procedures performed using charge groupings as the dependent variable showed significant differences at the 95 percent confidence level among all class variables shown in Table 12.

The Tukey's Studentized Range Test indicated that the mean trim-end length in the wire mesh box was significantly different from that of either rack charge (Table 13).

Table 13. Mean trim-end length, standard deviation (Std. Dev.) and Tukey grouping by charge. Length given in inches.

Charge	Mean	Std. Dev.	Tukey Group
Rack 1	21.9	4.1	A
Rack 2	21.4	4.8	A
Wire Mesh Box	19.7	6.1	B

Since pieces were taken in order from the top of two separate pallets of trim-ends, an obvious explanation for the shorter average piece length in the wire mesh box charge is not forthcoming. Though the means are statistically different, they only differed by a maximum of 2.2 inches.

In all cases the distribution was skewed to the right (24.0 maximum). Trim saws in the source mill (as in most mills) have their drop saws set at 24.0 inch intervals. Since they specialize in custom cut orders for truss manufactures, trim decisions may result in the removal of additional two foot sections (because of odd log length) to meet a cutting bill (order).

The percentage of heartwood contained in the wire mesh box was also statistically different from either rack charge, again, without any explainable cause (Table 14).

Table 14. Mean trim-end heartwood percentage, standard deviation (Std. Dev.) and Tukey grouping by charge.

Charge	Mean	Std. Dev.	Tukey Group
Rack 1	42	35	A
Rack 2	44	38	A
Wire Mesh Box	57	39	B

The mean initial moisture content of the wire mesh box charge was statistically different from that of the rack charges (Table 15).

Table 15. Mean trim-end initial moisture content, standard deviation (Std. Dev.) and Tukey grouping by charge.

Charge	Mean	Std. Dev.	Tukey Group
Rack 1	58.5	27.4	A
Rack 2	55.3	29.8	A
Wire Mesh Box	46.4	26.3	B

Higher average heartwood content obviously had an effect on the average initial moisture content of the wire mess box charge. Additionally, the material used in this phase of the experiment was all acquired on the same day so that each charge had a storage period differing by one week (0 to 2 weeks). Though the trim-ends were covered and indoors, moisture loss was inevitable and is evident in the downward trend of the means over time.

V.2.2 Charge Comparative Analysis

A comparison of space efficiency was made between the Carter-Sprague rack system and the wire mess box on the basis of nominal board foot of lumber per cubic foot of space. For a charge composed of equal parts four and six-inch lumber, the rack system held 9.1 nominal board feet per cubic foot of space while the wire mesh box held 5.7 nominal board feet per cubic foot of space or approximately 63% that of the racks. Any attempt to utilize the wire mesh box, assuming that it could be an effective charge formation scheme, would have to be a carefully weighed decision. The loss of kiln loading efficiency would need to be offset by labor and capital investment savings.

Analysis of variance and Tukey's Studentized Range Test procedures performed using charge groupings as the dependent variable showed a significant difference among all three mean final moisture contents in the Charge Formation Schemes phase (see Table 16). Statistical output is located in Appendix B.

Table 16. Mean trim-end final moisture content, standard deviation (Std. Dev.) and Tukey grouping by charge.

Charge	Mean	Std. Dev.	Tukey Group
Rack 1	14.0	4.4	A
Rack 2	11.6	3.4	B
Wire Mesh Box	9.2	2.5	C

Wood characteristics and experimental method both influenced the final moisture content of all three charges. The slightly shorter average length of the trim-ends in the wire mesh box could have contributed to this charge having the lowest mean final moisture content though the effect was likely to be minor comparison to other influences. Additional storage time and a higher heartwood percentage of the wood in the wire mesh box significantly reduced trim-end initial moisture content and therefore could have affected its mean final moisture content. Variation in drying time was primarily responsible for the average final moisture content deviation between charges. Rack 1, rack 2 and the wire mesh box were dried for 58, 62 and 64 hours respectively using the USDA recommended charge for low-grade Douglas-fir.

Two sets of standard deviation data were compiled to attempt to ascertain the effectiveness of the two charge-formation schemes utilized in the Charge Formation Schemes phase of this experiment. The first draws a comparison between the observed standard deviation in the three Charge Formation Schemes charges and the standard deviation of the resistance meter data used to monitor the Geometric Drying Properties phase. The second compares the standard deviations of four and six-inch wide trim-ends in the Rack 2 charge and the wire mesh box, with that of comparison boards from the Geometric Drying Properties phase.

Observed average standard deviations from the Charge Formation Schemes phase exhibited a comparative trend with that of the resistance pin data from the Geometric Drying Properties phase though the values were of a different magnitude (Figure 20). The trend toward a tighter standard deviation as average moisture content

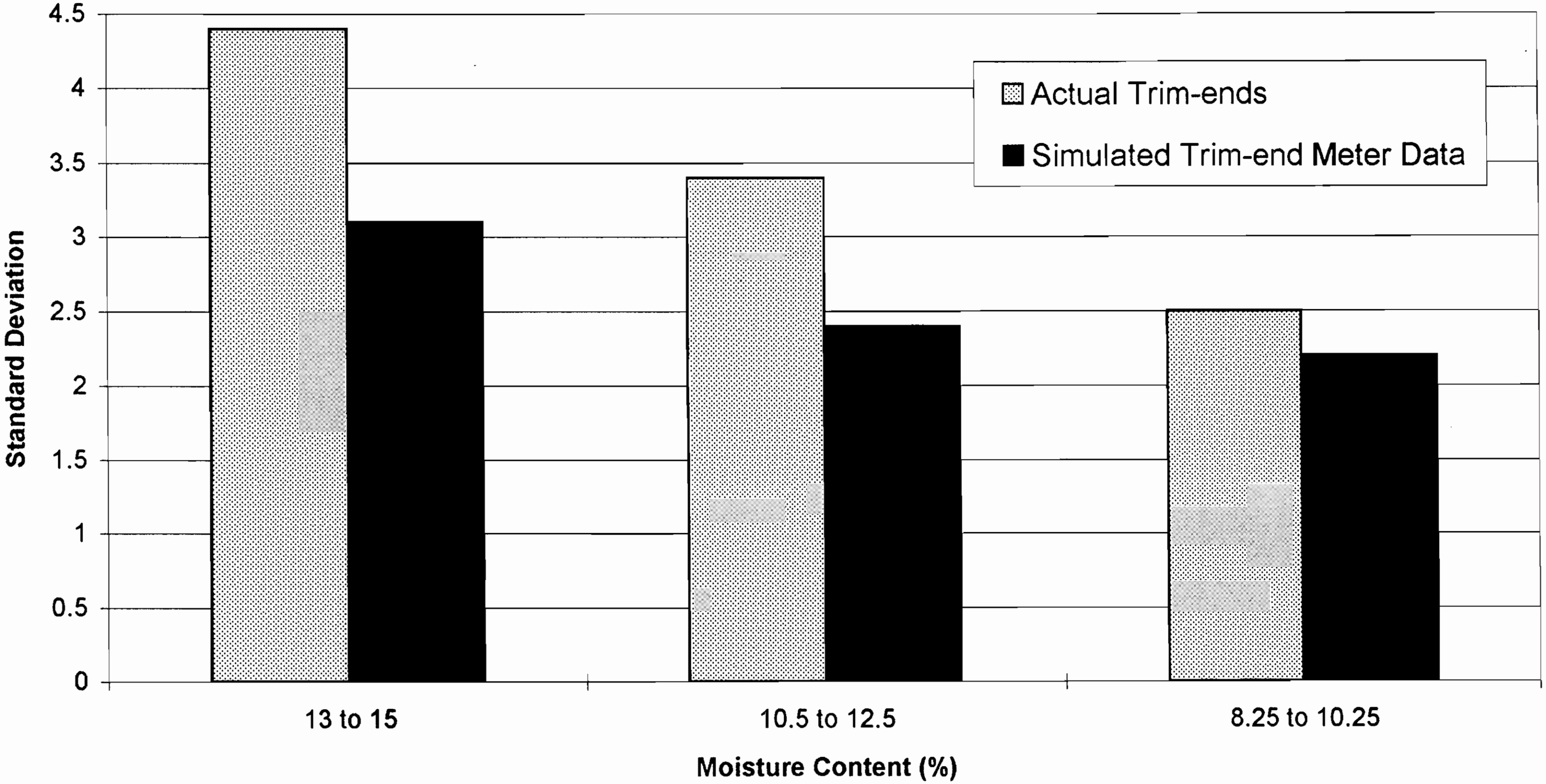

Figure 20. Graphical representation comparing average standard deviations of trim-end samples from the Charge Formation Schemes phase and standard deviations derived from moisture meter pin probe groups used in the Geometric Drying Properties phase expressed over comparable moisture content ranges.

decreases reflects the increased energy and time necessary to bring wood to these lower levels which contributes to the asymptotic nature of a drying curve. Though the standard deviations differ between the two treatments, they both exhibit the expect downward, asymptotic trend in standard deviation.

A more definitive measure of the effectiveness of the tested charge formation schemes relative to each other and conventional, long lumber is the following comparison of mean final moisture-content standard deviation for individual widths contained in Rack 2 and the wire-mesh box to that of 8.0 foot long lumber groups of the same width and similar mean final moisture content taken for the Geometric Drying Properties phase (Table 17). Comparisons were not made using the data from Rack 1 due to the high average final moisture content for both four and six inch widths (12.9 percent and 15.4 percent respectively). The 8.0 foot comparison groups in the Geometric Drying Properties phase lacked an average final moisture content high enough to make a meaningful comparison for either four or six inch widths (10.7 percent and 12.5 percent respectively).

Table 17. Average final moisture content comparisons for the Charge Formation Schemes phase. Eight-foot comparison board groups were taken from the Geometric Drying Properties phase.

Origin	Length	Width	Final MC	Std. Dev
Rack (2)	Trim-ends	4	10.7	2.7
Charge (1)	8.0 ft. Boards	4	10.7	1.9
Rack (2)	Trim-ends	6	12.9	4.0
Charge (1)	8.0 ft. Boards	6	12.5	2.4

Table 17. (Continued)

Origin	Length	Width	Final MC	Std. Dev
Wire Mesh Box	Trim-ends	4	9.4	2.6
Charge (2)	8.0 ft. Boards	4	9.5	1.9
Wire Mesh Box	Trim-ends	6	9.1	2.4
Charge (3)	8.0 ft. Boards	6	9.7	1.7

The average percent increase in standard deviation relative to the 8.0 foot comparison boards for Rack 2 and the wire mesh box was 34.8 percent and 40.1 percent respectively. It is important to note that the length of time the Charge Formation Schemes charges spent in the kiln was approximately 70 percent of that of the Geometric Drying Properties charges. This reduced length of time under a more severe schedule could have contributed to high standard deviations. It could also be expected that the increased sample size of the Charge Formation Schemes phase would have contributed to this increase. Additionally, the moisture content of long lumber varies across its length. Trim-ends could be expected to express this variation as individual pieces that would otherwise be hidden in the average moisture content of a long board.

VI. CONCLUSIONS

VI.1 Summary

The experimental findings presented in this thesis lead to the following conclusions regarding the drying of submerchantable length dimensional lumber.

Length affects the final moisture content of each individual piece; however, at the low moisture contents and subjected to the drying schedules utilized in this study, it does not have a significant effect on the overall average final moisture content of the entire charge due to the influence of other variables such as initial moisture content. Using the methods in this experiment, sorting by length would not be necessary.

Providing a space between blocks can significantly accelerate the drying rate in fresh lumber and may have a greater affect when combined with an appropriate kiln schedule developed for short pieces.

Choosing between a rack system and the wire mesh box for drying short pieces in a conventional kiln should be a carefully weighed decision. Although they performed comparably during the drying process additional research into their use should be conducted. The loss of space efficiency exhibited by the wire mesh box and the capital investment and additional labor required for the aluminum racks necessitates careful study by each individual, potential user to ascertain the most cost effective method.

VI.2 Suggestions for Further Research

Monitoring of real time drying rates for trim-ends would allow for a drying schedule to be formulated that takes full advantage of the accelerated drying rate of short pieces therefore reducing time and energy costs. It is suggested that experimental charges be composed of a single width and length of sample block and be large enough that total weight can be effectively monitored with load cells. Sample length should be 1.0, 2.0 and 3.0 foot so as to cover a broad range of potential trim-end pieces.

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APPENDICES

APPENDIX A

Data Sets

Table A1. Complete data set for Piece Geometry phase. Lengths are in feet, ring count in rings per inch, heartwood as a percentage and initial and final moisture content percentage on a dry basis. The hyphenated combination of charge, number, length and order creates a unique code for each board.

Charge	Length	Width	Spacing	#	Order	Pith	Ring	Heart	OD Wt.	MC_i	MC_f
1	0.5	4	No	41	2	1.50	6	80	0.245	40.816	8.163
1	0.5	4	No	42	1	1.50	7	30	0.235	108.511	8.511
1	0.5	4	No	43	6	1.25	5	65	0.245	63.265	8.163
1	0.5	4	No	44	5	4.50	8	0	0.250	124.000	12.000
1	0.5	4	No	45	4	3.00	6	32	0.260	63.462	1.923
1	0.5	4	No	46	3	1.50	5	100	0.235	40.426	4.255
1	0.5	4	No	47	2	2.00	5	55	0.265	62.264	5.660
1	0.5	4	No	48	1	3.50	3	25	0.250	78.000	4.000
1	0.5	4	No	49	6	2.00	6	100	0.215	25.581	6.977
1	0.5	4	Yes	411	4	0.75	5	45	0.245	57.143	2.041
1	0.5	4	Yes	412	3	0.00	5	100	0.240	22.917	2.083
1	0.5	4	Yes	413	3	4.00	8	2	0.225	80.000	2.222
1	0.5	4	Yes	414	1	1.50	3	1	0.250	68.000	4.000
1	0.5	4	Yes	415	1	0.00	6	96	0.230	21.739	2.174
1	0.5	4	Yes	416	2	4.25	6.5	0	0.285	91.228	7.018
1	0.5	4	Yes	417	4	2.75	7	20	0.280	62.500	5.357
1	0.5	6	No	61	1	2.00	5	20	0.390	73.077	8.974
1	0.5	6	No	62	6	2.50	5	80	0.455	29.670	6.593
1	0.5	6	No	63	5	2.50	7	45	0.405	54.321	8.642
1	0.5	6	No	64	4	2.75	7	40	0.385	74.026	10.390
1	0.5	6	No	65	3	2.00	3	10	0.410	82.927	8.537
1	0.5	6	No	66	2	1.75	4	65	0.350	57.143	8.571
1	0.5	6	Yes	69	6	4.00	4	0	0.400	97.500	10.000
1	0.5	6	Yes	610	5	1.75	6	30	0.400	56.250	7.500
1	0.5	6	Yes	611	3	3.50	6	0	0.365	115.068	8.219
1	0.5	6	Yes	612	3	2.00	5	90	0.420	39.286	5.952
1	0.5	8	No	81	1	0.50	6	86	0.460	25.000	6.522
1	0.5	8	No	82	6	0.00	5	90	0.485	24.742	6.186
1	0.5	8	No	85	1	0.00	5	75	0.460	20.652	6.522
1	0.5	8	Yes	83	5	0.00	3.5	78	0.515	28.155	6.796
1	0.5	8	Yes	84	4	3.00	10	0	0.575	33.043	6.957
1	1.0	4	No	41	3	2.25	7	68	0.495	54.545	9.091
1	1.0	4	No	42	2	1.50	7	32	0.465	108.602	10.753

Table A1. (continued)

1	1.0	4	No	43	1	2.50	4	48	0.510	85.294	9.804
1	1.0	4	No	44	6	4.50	7	0	0.485	111.340	9.278
1	1.0	4	No	45	5	2.50	7	32	0.520	70.192	8.654
1	1.0	4	No	46	4	1.00	6	99	0.460	44.565	5.435
1	1.0	4	No	47	3	2.75	5	52	0.515	59.223	8.738
1	1.0	4	No	48	2	3.50	3.5	22	0.485	80.412	9.278
1	1.0	4	No	49	1	2.00	5	100	0.440	22.727	5.682
1	1.0	4	Yes	410	6	0.00	5	100	0.455	21.978	5.495
1	1.0	4	Yes	411	5	0.75	5	45	0.505	59.406	6.931
1	1.0	4	Yes	412	4	0.00	5	100	0.480	25.000	6.250
1	1.0	4	Yes	413	4	4.50	9	5	0.425	85.882	8.235
1	1.0	4	Yes	414	2	2.50	3	2	0.505	70.297	6.931
1	1.0	4	Yes	415	2	0.00	5	95	0.460	23.913	6.522
1	1.0	4	Yes	416	3	4.00	6	0	0.580	87.069	10.345
1	1.0	4	Yes	417	2	3.50	7	30	0.540	77.778	9.259
1	1.0	4	Yes	418	1	1.00	4.5	100	0.525	22.857	5.714
1	1.0	6	No	61	2	2.00	5	25	0.760	66.447	11.842
1	1.0	6	No	62	1	3.00	4	20	0.870	35.057	8.621
1	1.0	6	No	63	6	2.00	7	45	0.835	58.084	9.581
1	1.0	6	No	64	5	2.50	9	40	0.800	78.125	13.125
1	1.0	6	No	65	4	1.50	4	5	0.585	157.265	58.120
1	1.0	6	No	66	3	0.75	4	55	0.745	57.718	8.725
1	1.0	6	Yes	68	2	1.50	5	45	0.755	80.132	9.272
1	1.0	6	Yes	69	1	5.00	4.5	0	0.810	40.123	8.642
1	1.0	6	Yes	610	6	2.00	6	27	0.770	53.247	9.091
1	1.0	6	Yes	611	1	3.50	5	0	0.780	119.231	10.897
1	1.0	6	Yes	612	4	1.00	5	85	0.835	40.120	8.982
1	1.0	8	No	81	2	0.50	6	82	0.840	28.571	8.333
1	1.0	8	No	84	5	2.50	10	0	1.170	32.051	9.402
1	1.0	8	Yes	82	1	0.50	5	90	1.030	24.272	7.767
1	1.0	8	Yes	83	6	0.00	4	78	0.890	25.843	7.303
1	1.0	8	Yes	85	2	0.00	5	76	1.475	36.610	8.136
1	1.5	4	No	41	4	1.50	7	60	0.780	70.513	10.897
1	1.5	4	No	42	3	1.00	7	60	0.705	70.213	7.092
1	1.5	4	No	43	2	1.50	5	43	0.765	77.778	11.765
1	1.5	4	No	44	1	2.50	11	30	0.830	100.602	16.265
1	1.5	4	No	45	6	2.50	6	35	0.755	54.305	8.609
1	1.5	4	No	46	5	1.50	4	90	0.695	43.885	7.914
1	1.5	4	No	47	4	2.00	5	70	0.800	53.125	9.375
1	1.5	4	No	48	3	2.50	3	25	0.735	84.354	9.524
1	1.5	4	No	49	2	2.00	6	100	0.665	24.812	7.519
1	1.5	4	Yes	410	1	0.00	5	80	0.715	25.874	5.594
1	1.5	4	Yes	411	6	0.75	5	60	0.760	61.842	7.237
1	1.5	4	Yes	412	5	0.25	5	100	0.705	24.113	6.383
1	1.5	4	Yes	413	1	4.50	7.5	2	0.675	80.741	9.630
1	1.5	4	Yes	414	3	2.00	3	1	0.780	67.308	7.051
1	1.5	4	Yes	415	3	0.00	5.5	100	0.710	23.944	6.338
1	1.5	4	Yes	416	4	4.00	5.5	2	0.860	93.023	12.791

Table A1. (continued)

1	1.5	4	Yes	417	3	3.50	7	20	0.785	84.713	12.739
1	1.5	4	Yes	418	2	0.75	4	100	0.810	24.074	6.173
1	1.5	6	No	61	3	2.00	5	20	1.135	85.022	11.013
1	1.5	6	No	62	2	3.00	4	30	1.255	35.857	9.960
1	1.5	6	No	63	1	2.50	8	20	1.170	87.607	13.675
1	1.5	6	No	64	6	3.00	9	0	1.190	78.151	11.345
1	1.5	6	No	65	5	2.50	4	2	1.250	74.800	12.000
1	1.5	6	No	66	4	1.00	4	55	1.060	65.566	10.377
1	1.5	6	Yes	67	4	1.50	4	1	1.255	68.526	9.960
1	1.5	6	Yes	68	3	1.00	4	35	1.175	86.383	11.064
1	1.5	6	Yes	69	2	4.25	4.5	0	1.255	67.331	10.359
1	1.5	6	Yes	610	1	2.00	5	50	1.265	64.427	11.067
1	1.5	6	Yes	611	6	3.50	7	10	1.360	94.118	16.544
1	1.5	6	Yes	612	5	1.00	5	87	1.270	38.189	9.055
1	1.5	8	No	81	3	1.50	6	80	1.290	29.457	8.915
1	1.5	8	No	82	2	0.50	5	95	1.580	26.582	8.544
1	1.5	8	Yes	84	6	3.00	11	0	1.835	34.332	9.264
1	1.5	8	Yes	85	3	0.00	5	75	1.920	50.521	10.156
1	2.0	4	No	41	5	3.00	13	35	1.060	61.321	9.906
1	2.0	4	No	42	4	1.00	6	60	0.980	55.612	8.673
1	2.0	4	No	43	3	2.50	5	58	1.030	54.854	11.165
1	2.0	4	No	44	2	3.75	9	20	1.075	112.558	15.814
1	2.0	4	No	45	1	2.50	6	5	0.930	98.925	11.290
1	2.0	4	No	46	6	1.00	5	95	0.930	29.032	8.065
1	2.0	4	No	47	5	2.00	4.5	60	1.025	52.195	11.220
1	2.0	4	No	48	4	3.50	3	20	1.005	77.114	12.438
1	2.0	4	No	49	3	1.50	6	100	0.900	25.000	7.778
1	2.0	4	Yes	410	2	0.00	4.5	96	0.880	22.727	6.250
1	2.0	4	Yes	411	1	0.75	5	33	0.965	56.995	8.290
1	2.0	4	Yes	412	6	0.50	4.5	100	0.930	24.194	6.989
1	2.0	4	Yes	413	5	4.75	9	3	0.885	79.661	10.734
1	2.0	4	Yes	414	4	1.75	3.5	5	1.020	60.784	9.314
1	2.0	4	Yes	415	4	0.00	5	100	0.945	23.810	6.878
1	2.0	4	Yes	416	5	3.50	5.5	5	1.170	75.641	11.966
1	2.0	4	Yes	417	6	2.25	6	70	1.090	37.156	7.339
1	2.0	6	No	61	4	2.25	5	15	1.535	95.765	13.355
1	2.0	6	No	62	3	2.00	5	70	1.745	40.401	9.742
1	2.0	6	No	63	3	2.50	8	20	1.615	57.585	9.288
1	2.0	6	No	64	1	3.50	7	55	1.540	61.039	9.740
1	2.0	6	No	65	6	2.00	4	2.5	1.615	72.136	12.384
1	2.0	6	No	66	5	1.00	4.5	50	1.440	61.806	10.417
1	2.0	6	Yes	67	5	2.00	4	7	1.625	70.769	11.692
1	2.0	6	Yes	69	3	4.50	4.5	0	1.630	92.945	13.804
1	2.0	6	Yes	610	2	2.00	6	45	1.705	56.012	11.144
1	2.0	6	Yes	611	2	4.00	6.5	0	1.495	123.746	15.719
1	2.0	6	Yes	612	6	1.50	5	85	1.655	35.650	9.063
1	2.0	8	No	83	2	0.00	3.5	80	1.910	26.178	7.853
1	2.0	8	Yes	82	3	0.00	4	96	2.065	25.908	7.748

Table A1. (continued)

1	2.0	8	Yes	84	1	4.00	10	0	2.590	38.803	9.459
1	2.5	4	No	41	6	1.75	7	60	1.275	35.294	8.627
1	2.5	4	No	42	5	1.00	6.5	65	1.225	75.102	8.163
1	2.5	4	No	43	4	1.50	5	75	1.265	51.383	10.277
1	2.5	4	No	44	3	3.00	8	15	1.350	109.259	15.556
1	2.5	4	No	45	2	2.50	6.5	10	1.270	101.575	11.024
1	2.5	4	No	46	1	1.25	4	90	1.190	44.958	8.403
1	2.5	4	No	46	2	1.50	4	90	1.730	45.376	8.382
1	2.5	4	No	47	6	2.00	4.5	70	1.315	46.768	9.506
1	2.5	4	No	48	5	3.00	3	23	1.280	73.438	12.500
1	2.5	4	No	49	4	2.00	6	100	1.220	23.361	6.148
1	2.5	4	Yes	410	3	0.00	5	99	1.160	22.414	5.603
1	2.5	4	Yes	411	2	0.75	5	35	1.220	53.279	7.377
1	2.5	4	Yes	412	1	0.00	5.5	100	1.220	25.000	7.377
1	2.5	4	Yes	413	6	4.50	9	1	1.060	75.000	9.906
1	2.5	4	Yes	414	5	2.00	3.5	27	1.305	42.912	8.429
1	2.5	4	Yes	415	5	0.00	5	100	1.150	23.478	6.522
1	2.5	4	Yes	416	6	4.50	6	1	1.395	91.039	12.545
1	2.5	4	Yes	417	5	2.00	5.5	70	1.345	47.584	8.922
1	2.5	4	Yes	418	3	0.75	4	100	1.340	23.881	6.716
1	2.5	6	No	61	5	2.00	5	10	1.940	95.103	11.598
1	2.5	6	No	62	4	2.00	5	72	2.160	33.102	8.796
1	2.5	6	No	63	3	2.50	8	25	1.950	57.179	11.026
1	2.5	6	No	64	2	2.25	8	45	1.770	75.424	23.729
1	2.5	6	No	65	1	2.00	4	15	1.970	101.269	23.350
1	2.5	6	No	66	6	1.00	4	50	1.865	65.952	10.188
1	2.5	6	Yes	67	6	1.50	4	25	2.050	63.415	10.244
1	2.5	6	Yes	68	5	1.00	5	35	1.900	109.211	12.368
1	2.5	6	Yes	69	4	4.50	4	0	2.090	91.148	15.789
1	2.5	6	Yes	610	3	1.50	6	72	2.095	47.494	9.308
1	2.5	6	Yes	611	4	3.50	6	0	1.935	109.302	13.695
1	2.5	6	Yes	612	1	1.50	5	95	2.165	31.178	9.469
1	2.5	8	No	83	3	0.00	3	78	2.225	26.067	8.764
1	2.5	8	No	84	2	4.00	10	70	3.220	27.950	9.938
1	2.5	8	Yes	81	4	1.00	5	85	2.195	29.613	7.517
1	2.5	8	Yes	82	4	0.00	5	90	2.535	25.444	7.890
1	3.5	4	No	41	1	1.25	6.5	95	1.715	32.653	8.455
1	3.5	4	No	42	6	2.00	7	35	1.790	118.436	15.363
1	3.5	4	No	43	5	2.50	4	72	1.830	45.902	8.470
1	3.5	4	No	44	4	2.50	9	20	1.885	112.202	15.385
1	3.5	4	No	45	3	3.00	7	5	1.795	88.301	12.535
1	3.5	4	No	47	1	2.50	6	20	1.890	76.455	13.492
1	3.5	4	No	48	6	3.50	3	21	1.845	59.892	11.111
1	3.5	4	No	49	5	1.75	6	100	1.635	23.242	6.728
1	3.5	4	Yes	410	4	0.00	5	99	1.640	22.866	6.402
1	3.5	4	Yes	411	3	0.50	5	52	1.680	53.869	8.333
1	3.5	4	Yes	412	2	0.00	5	100	1.750	24.857	7.714
1	3.5	4	Yes	413	2	4.50	8	10	1.500	90.333	11.333

Table A1. (continued)

1	3.5	4	Yes	414	6	0.50	4	40	1.820	35.989	8.242
1	3.5	4	Yes	415	6	0.50	4	99	1.625	23.692	6.462
1	3.5	4	Yes	416	1	2.75	5	60	2.010	71.891	11.443
1	3.5	4	Yes	417	1	1.25	6	45	1.845	67.480	10.569
1	3.5	6	No	61	6	2.50	5	5	2.670	84.831	12.921
1	3.5	6	No	62	5	2.25	5	75	2.840	41.725	18.486
1	3.5	6	No	63	4	2.75	9	20	3.015	67.164	12.106
1	3.5	6	No	64	3	2.50	7	45	2.570	78.210	22.568
1	3.5	6	No	65	2	2.00	4	22	2.995	74.624	10.851
1	3.5	6	No	66	1	1.00	4	60	2.265	61.589	21.854
1	3.5	6	Yes	67	1	2.00	4.5	0	2.815	73.179	10.835
1	3.5	6	Yes	68	6	1.00	4	25	2.750	113.818	15.273
1	3.5	6	Yes	69	5	5.00	4.5	0	2.900	85.172	13.621
1	3.5	6	Yes	610	4	1.50	6	32	2.895	47.841	10.708
1	3.5	6	Yes	611	5	4.50	6	2	3.040	83.388	17.105
1	3.5	6	Yes	612	2	1.00	5	95	3.090	34.304	8.900
1	3.5	8	No	81	6	0.50	5	85	3.050	25.738	7.705
1	3.5	8	No	84	3	3.50	10	30	4.340	25.461	8.756
1	3.5	8	Yes	82	5	0.00	5	85	3.535	25.177	8.062
1	3.5	8	Yes	83	4	0.00	3	78	3.290	26.292	8.207
1	8.0	4	2	1	1	0.00	5.5	100	4.190	24.940	8.592
1	8.0	4	2	2	1	2.00	5	1	3.435	90.393	9.607
1	8.0	4	2	3	1	2.00	6	20	3.510	80.912	11.254
1	8.0	4	2	4	1	2.00	5	25	3.315	69.834	9.351
1	8.0	4	2	5	1	3.50	16	5	4.720	33.369	10.911
1	8.0	4	2	6	1	2.50	11	1	4.600	70.870	13.370
1	8.0	4	2	7	1	2.50	13	70	5.015	59.920	13.161
1	8.0	4	2	8	1	3.50	18	20	4.660	39.807	12.124
1	8.0	4	2	9	1	2.75	7	12	3.945	101.648	12.801
1	8.0	4	2	10	1	3.00	7	80	3.480	58.190	9.339
1	8.0	4	2	11	1	3.75	15	20	4.950	48.485	10.808
1	8.0	4	2	12	1	0.00	5	95	3.570	25.350	7.283
1	8.0	6	2	1	1	2.50	6	0	6.413	111.764	12.821
1	8.0	6	2	2	1	2.50	5.5	20	6.453	116.805	15.686
1	8.0	6	2	3	1	2.00	6	83	7.338	40.710	10.455
1	8.0	6	2	4	1	2.50	5	0	5.628	97.768	11.145
1	8.0	6	2	5	1	7.00	19	25	7.393	78.755	15.450
1	8.0	6	2	6	1	1.75	5.5	28	6.863	96.276	14.166
1	8.0	6	2	7	1	2.00	5	22	6.363	51.427	10.172
1	8.0	6	2	8	1	3.75	13	10	6.383	66.463	9.905
1	8.0	8	2	1	1	4.00	5	64	7.674	47.191	11.029
1	8.0	8	2	2	1	7.00	6	70	9.134	24.265	10.032
2	0.5	4	No	41	6	0.00	5	100	0.225	26.667	6.667
2	0.5	4	No	42	5	1.00	4.5	72	0.245	40.816	6.122
2	0.5	4	No	43	4	0.00	5	82	0.245	20.408	6.122
2	0.5	4	No	44	1	3.25	3	25	0.245	55.102	6.122
2	0.5	4	No	45	2	0.00	3	100	0.225	24.444	6.667
2	0.5	4	No	46	1	0.50	2.5	100	0.245	28.571	6.122

Table A1. (continued)

2	0.5	4	No	47	5	2.50	5	20	0.270	40.741	7.407
2	0.5	4	No	48	1	2.25	3	85	0.250	24.000	6.000
2	0.5	4	No	49	6	3.00	8	45	0.285	28.070	5.263
2	0.5	4	Yes	410	6	1.50	3	97	0.240	25.000	6.250
2	0.5	4	Yes	411	4	2.00	5	55	0.275	38.182	5.455
2	0.5	4	Yes	412	3	0.00	5	100	0.230	23.913	6.522
2	0.5	4	Yes	413	2	1.50	4.5	95	0.215	27.907	9.302
2	0.5	4	Yes	414	1	2.00	5	90	0.210	28.571	9.524
2	0.5	4	Yes	415	6	0.00	4	99	0.250	22.000	6.000
2	0.5	4	Yes	416	1	1.25	5.5	10	0.270	51.852	9.259
2	0.5	4	Yes	417	5	1.00	5	85	0.230	28.261	6.522
2	0.5	6	No	61	4	2.25	5.5	5	0.370	35.135	6.757
2	0.5	6	No	62	3	1.50	6	75	0.370	25.676	5.405
2	0.5	6	No	63	2	1.50	5	10	0.395	89.873	10.127
2	0.5	6	No	64	1	3.50	5	95	0.415	28.916	7.229
2	0.5	6	No	65	2	1.50	4	30	0.380	25.000	6.579
2	0.5	6	No	66	3	1.25	5	25	0.360	40.278	6.944
2	0.5	6	No	66	6	1.75	5	40	0.390	34.615	6.410
2	0.5	6	No	66	7	1.50	5	40	0.390	34.615	6.410
2	0.5	6	Yes	67	1	3.00	7	10	0.310	85.484	6.452
2	0.5	6	Yes	68	6	3.00	7.5	15	0.420	46.429	7.143
2	0.5	6	Yes	69	5	2.00	5.5	60	0.405	24.691	4.938
2	0.5	6	Yes	610	4	1.75	7	50	0.395	31.646	6.329
2	0.5	6	Yes	611	3	2.50	11	35	0.485	27.835	7.216
2	0.5	6	Yes	612	3	2.00	4	15	0.410	29.268	7.317
2	0.5	8	No	82	2	0.50	4.5	50	0.580	25.000	9.483
2	0.5	8	No	83	6	1.50	4	100	0.490	18.367	7.143
2	0.5	8	Yes	81	1	7.50	5	0	0.530	33.019	6.604
2	0.5	8	Yes	84	5	2.25	4	78	0.475	21.053	5.263
2	1.0	4	No	41	1	0.00	6	100	0.470	25.532	6.383
2	1.0	4	No	42	6	0.50	5	76	0.475	40.000	7.368
2	1.0	4	No	43	5	0.00	5	95	0.480	23.958	18.750
2	1.0	4	No	44	4	3.25	3	80	0.470	26.596	7.447
2	1.0	4	No	45	3	0.50	2.5	100	0.455	23.077	6.593
2	1.0	4	No	46	2	1.50	3	95	0.480	29.167	8.333
2	1.0	4	No	47	1	4.75	5.5	0	0.475	33.684	7.368
2	1.0	4	No	48	2	2.25	3	40	0.510	31.373	7.843
2	1.0	4	Yes	410	2	2.00	3	95	0.450	21.111	6.667
2	1.0	4	Yes	411	5	2.75	5	30	0.575	37.391	8.696
2	1.0	4	Yes	412	4	0.00	5	99	0.480	21.875	6.250
2	1.0	4	Yes	413	3	1.25	4	95	0.425	22.353	5.882
2	1.0	4	Yes	414	2	2.00	4.5	90	0.445	25.843	6.742
2	1.0	4	Yes	415	1	1.50	5	88	0.505	21.782	6.931
2	1.0	4	Yes	416	2	2.00	6	0	0.540	54.630	9.259
2	1.0	4	Yes	417	6	1.25	5	85	0.475	22.105	7.368
2	1.0	4	Yes	418	1	0.00	5	100	0.435	22.989	5.747
2	1.0	6	No	61	5	2.00	6	10	0.720	37.500	8.333
2	1.0	6	No	62	4	1.75	6	70	0.730	26.027	7.534

Table A1. (continued)

2	1.0	6	No	63	3	2.00	5	10	0.800	93.125	15.000
2	1.0	6	No	64	2	3.00	5	100	0.835	28.743	8.982
2	1.0	6	No	65	1	1.50	4.5	30	0.755	23.179	7.947
2	1.0	6	No	66	4	1.50	5	30	0.755	37.086	7.285
2	1.0	6	Yes	67	2	3.25	7	22	0.645	82.171	7.752
2	1.0	6	Yes	68	1	3.50	6.5	40	0.790	64.557	11.392
2	1.0	6	Yes	69	6	3.50	6	65	0.835	25.749	6.587
2	1.0	6	Yes	610	5	1.75	6.5	50	0.805	30.435	8.075
2	1.0	6	Yes	611	4	2.50	10	45	0.995	27.136	8.543
2	1.0	6	Yes	612	1	2.00	4	10	0.780	26.923	7.692
2	1.0	8	No	81	2	7.50	5	0	1.060	40.094	9.906
2	1.0	8	Yes	82	3	0.50	6	100	1.130	23.009	7.522
2	1.0	8	Yes	83	1	2.00	4.5	100	1.120	21.875	7.143
2	1.0	8	Yes	84	6	2.50	4	79	0.950	21.053	6.316
2	1.0	8	Yes	86	1	1.00	7	85	1.085	22.120	7.834
2	1.5	4	No	41	2	0.00	6	100	0.730	26.027	7.534
2	1.5	4	No	42	1	1.00	4.5	32	0.765	61.438	8.497
2	1.5	4	No	43	6	0.00	5	95	0.770	24.026	7.143
2	1.5	4	No	44	5	1.75	3	70	0.745	26.174	7.383
2	1.5	4	No	45	4	0.75	3	99	0.705	23.404	7.092
2	1.5	4	No	46	3	1.75	3	95	0.765	28.758	7.190
2	1.5	4	No	47	2	4.75	6	0	0.785	45.223	8.917
2	1.5	4	No	48	3	2.50	3	40	0.775	34.194	8.387
2	1.5	4	No	49	2	2.25	7.5	70	0.895	30.168	8.380
2	1.5	4	Yes	410	1	2.00	3	99	0.675	19.259	6.667
2	1.5	4	Yes	411	6	3.50	5	40	0.890	32.584	8.427
2	1.5	4	Yes	412	5	0.00	5.5	99	0.785	22.930	7.643
2	1.5	4	Yes	413	4	1.25	4	95	0.680	24.265	6.618
2	1.5	4	Yes	414	3	2.00	5	85	0.665	24.812	7.519
2	1.5	4	Yes	415	2	1.25	4.5	90	0.750	22.667	8.000
2	1.5	4	Yes	416	3	2.25	6	0	0.830	54.819	10.241
2	1.5	4	Yes	417	1	1.50	6	32	0.730	59.589	9.589
2	1.5	4	Yes	418	2	0.00	5	100	0.700	23.571	6.429
2	1.5	4	Yes	418	3	0.00	5.5	100	0.695	23.741	7.194
2	1.5	6	No	61	6	1.50	5	20	1.100	45.909	9.545
2	1.5	6	No	62	5	1.50	6	65	1.150	25.217	7.826
2	1.5	6	No	63	4	1.50	4.5	15	1.245	89.558	14.056
2	1.5	6	No	64	3	3.25	4.5	100	1.280	27.734	8.594
2	1.5	6	No	65	3	1.00	4	60	1.145	24.017	7.860
2	1.5	6	No	66	2	1.50	5	20	1.120	40.625	8.036
2	1.5	6	Yes	67	3	3.25	7	22	0.985	93.909	10.152
2	1.5	6	Yes	68	2	2.50	7	35	1.215	64.198	12.757
2	1.5	6	Yes	69	1	2.75	6	45	1.235	33.603	7.692
2	1.5	6	Yes	610	6	2.00	7	65	1.295	28.571	8.108
2	1.5	6	Yes	611	5	4.00	11	40	1.495	26.756	8.696
2	1.5	6	Yes	612	2	2.00	4	15	1.205	27.386	7.884
2	1.5	8	No	81	3	7.00	5	0	1.600	40.000	8.438
2	1.5	8	No	83	2	2.00	4.5	100	1.710	21.637	7.895

Table A1. (continued)

2	1.5	8	No	86	2	1.00	7	80	1.760	21.875	9.091
2	1.5	8	Yes	82	4	1.25	5	100	1.750	23.429	8.857
2	1.5	8	Yes	84	1	2.50	5	82	1.500	20.667	7.000
2	2.0	4	No	41	3	0.00	5	100	0.950	23.684	6.316
2	2.0	4	No	42	2	1.00	5	35	0.955	69.634	7.853
2	2.0	4	No	43	1	0.00	5	77	1.015	25.616	7.882
2	2.0	4	No	44	6	2.00	3	60	0.970	23.196	7.732
2	2.0	4	No	45	5	0.50	3	99	0.885	22.599	7.345
2	2.0	4	No	46	4	1.50	3	99	0.950	27.895	7.368
2	2.0	4	No	47	3	4.50	5	0	1.090	48.624	9.633
2	2.0	4	No	48	4	3.50	4	30	1.025	43.902	9.756
2	2.0	4	Yes	410	3	1.25	3.5	99	0.875	22.286	8.000
2	2.0	4	Yes	411	1	2.50	3	90	1.085	25.346	8.295
2	2.0	4	Yes	412	6	0.00	5	100	0.975	23.077	8.205
2	2.0	4	Yes	413	5	1.50	5	95	0.885	22.034	7.345
2	2.0	4	Yes	414	4	2.50	5	90	0.920	26.630	8.152
2	2.0	4	Yes	415	3	0.50	4.5	90	0.995	22.111	7.538
2	2.0	4	Yes	416	4	2.00	5	0	1.160	46.983	9.914
2	2.0	4	Yes	417	2	2.75	7	22	0.960	69.271	9.896
2	2.0	4	Yes	418	4	0.25	4.5	100	0.925	23.243	7.027
2	2.0	4	Yes	418	5	0.75	5	100	0.885	23.729	7.345
2	2.0	6	No	61	1	2.00	5	70	1.570	29.618	7.962
2	2.0	6	No	62	6	1.50	6	65	1.515	25.743	7.921
2	2.0	6	No	63	5	1.50	5	20	1.705	77.713	13.783
2	2.0	6	No	64	4	2.00	4.5	100	1.610	27.640	9.938
2	2.0	6	No	65	4	1.50	4	45	1.610	23.602	7.453
2	2.0	6	Yes	67	4	2.50	6.5	27	1.310	70.992	10.687
2	2.0	6	Yes	68	3	2.75	7	40	1.630	60.123	13.497
2	2.0	6	Yes	69	2	3.50	7	42	1.625	37.538	8.923
2	2.0	6	Yes	610	1	2.25	8	20	1.600	53.125	11.563
2	2.0	6	Yes	611	6	2.50	7.5	50	2.015	26.551	9.429
2	2.0	8	No	81	4	7.25	5.5	0	2.060	36.408	8.495
2	2.0	8	No	84	2	2.25	4	85	2.065	20.097	7.990
2	2.0	8	Yes	82	5	1.25	3.5	98	2.230	22.197	7.623
2	2.0	8	Yes	83	3	1.50	4	100	2.210	20.136	7.240
2	2.5	4	No	41	4	0.00	5	100	1.195	25.523	6.695
2	2.5	4	No	42	3	1.00	5	37	1.235	70.040	8.097
2	2.5	4	No	43	2	0.00	5	77	1.255	25.498	7.570
2	2.5	4	No	44	2	2.00	3	60	1.230	29.675	7.724
2	2.5	4	No	45	5	0.50	3	85	1.150	23.913	7.391
2	2.5	4	No	46	5	1.50	3	95	1.165	28.755	7.725
2	2.5	4	No	47	4	3.50	5.5	0	1.400	51.429	9.643
2	2.5	4	No	48	5	2.50	3.5	22	1.240	49.194	9.274
2	2.5	4	No	49	4	2.00	7.5	40	1.520	29.605	9.211
2	2.5	4	Yes	410	4	2.25	3	99	1.175	21.277	7.234
2	2.5	4	Yes	411	2	2.25	4	95	1.395	25.448	8.602
2	2.5	4	Yes	412	1	0.00	5.5	100	1.210	21.488	7.025
2	2.5	4	Yes	414	5	2.25	5	95	1.115	26.906	7.175

Table A1. (continued)

2	2.5	4	Yes	415	4	0.50	4	95	1.250	22.400	7.600
2	2.5	4	Yes	416	5	2.25	6	99	1.475	52.203	11.186
2	2.5	4	Yes	417	3	3.50	7	20	1.215	60.494	9.053
2	2.5	6	No	61	2	2.00	5	40	1.985	28.967	8.060
2	2.5	6	No	62	1	1.25	5.5	80	1.935	23.256	7.494
2	2.5	6	No	63	6	0.50	6	65	2.105	63.895	11.164
2	2.5	6	No	64	5	1.75	4	100	1.995	27.318	8.521
2	2.5	6	No	65	5	2.00	4	55	2.055	23.358	7.786
2	2.5	6	No	66	1	1.75	5	20	1.890	38.624	9.524
2	2.5	6	No	66	5	1.50	5.5	30	2.015	34.739	9.429
2	2.5	6	Yes	67	5	2.75	6.5	25	1.725	66.957	8.986
2	2.5	6	Yes	68	4	3.25	7.5	50	2.035	62.408	13.759
2	2.5	6	Yes	69	3	3.25	7	50	2.035	37.592	8.845
2	2.5	6	Yes	610	2	2.00	7	40	2.060	43.932	9.466
2	2.5	6	Yes	611	1	3.25	9.5	35	2.370	24.684	8.861
2	2.5	6	Yes	612	4	2.00	4.5	22	2.060	28.155	8.252
2	2.5	8	No	82	6	1.50	6	95	2.905	21.170	8.434
2	2.5	8	No	83	4	1.50	3.5	100	2.645	20.227	6.994
2	2.5	8	No	84	3	2.25	4	80	2.610	19.540	7.854
2	2.5	8	No	85	1	3.50	10	70	3.180	23.428	10.063
2	2.5	8	Yes	81	6	7.25	4.5	0	2.605	35.509	8.637
2	2.5	8	Yes	81	5	7.00	5.5	0	2.545	34.185	8.841
2	3.5	4	No	41	5	0.00	5	100	1.645	24.316	6.991
2	3.5	4	No	42	4	1.00	4	37	1.715	49.271	7.872
2	3.5	4	No	43	3	0.00	5	82	1.760	23.864	7.102
2	3.5	4	No	44	3	3.25	3	75	1.670	27.545	7.186
2	3.5	4	No	45	1	0.75	2.5	100	1.650	23.030	6.970
2	3.5	4	No	46	6	2.00	3	75	1.745	29.799	7.450
2	3.5	4	No	47	6	2.25	5	25	1.980	43.687	9.091
2	3.5	4	No	48	6	2.50	3.5	0	1.785	62.745	10.924
2	3.5	4	No	49	5	2.75	8	25	2.130	27.934	8.685
2	3.5	4	Yes	410	5	1.50	3	97	1.685	20.772	7.418
2	3.5	4	Yes	411	3	2.50	3.5	90	2.005	33.915	9.726
2	3.5	4	Yes	412	2	0.00	5.5	100	1.710	21.637	7.895
2	3.5	4	Yes	413	1	1.75	4.5	85	1.620	22.531	7.099
2	3.5	4	Yes	413	6	1.25	4	99	1.135	21.586	6.608
2	3.5	4	Yes	414	6	3.00	5	100	1.630	23.620	7.055
2	3.5	4	Yes	415	5	0.25	4	99	1.745	20.630	6.877
2	3.5	4	Yes	416	6	2.00	6	10	2.080	49.519	11.538
2	3.5	4	Yes	417	4	1.25	5.5	100	1.700	26.765	7.647
2	3.5	6	No	61	3	1.75	6	20	2.740	31.752	8.942
2	3.5	6	No	62	2	1.25	5.5	75	2.690	23.792	7.993
2	3.5	6	No	63	1	1.00	5	35	2.910	77.835	14.777
2	3.5	6	No	64	6	1.75	5	100	3.030	26.403	8.911
2	3.5	6	No	65	6	2.00	4	60	2.920	23.973	7.705
2	3.5	6	Yes	67	6	3.50	7	30	2.445	83.845	12.679
2	3.5	6	Yes	68	5	2.00	7	40	2.935	47.019	11.073
2	3.5	6	Yes	69	4	2.00	6	70	2.890	29.239	8.478

Table A1. (continued)

2	3.5	6	Yes	610	3	2.00	6.5	40	2.935	34.242	9.029
2	3.5	6	Yes	611	2	3.00	10	40	3.520	25.994	9.517
2	3.5	6	Yes	612	5	2.25	4	55	2.875	27.130	8.174
2	3.5	8	No	83	5	1.25	4	100	3.800	20.263	6.974
2	3.5	8	Yes	82	1	1.50	8.5	85	4.405	21.112	9.194
2	3.5	8	Yes	84	4	2.50	4	80	3.480	18.678	6.753
2	8.0	4	2	1	1	0.00	6	100	4.360	21.330	8.028
2	8.0	4	2	2	1	3.50	3.5	35	3.385	56.573	8.124
2	8.0	4	2	3	1	1.00	4.5	65	3.825	52.026	10.065
2	8.0	4	2	4	1	3.50	4	1	3.925	83.567	12.229
2	8.0	4	2	5	1	6.50	5	12	3.845	23.667	7.932
2	8.0	4	2	6	1	1.00	4	100	4.265	19.578	7.737
2	8.0	4	2	7	1	3.75	9	40	4.915	21.261	8.749
2	8.0	4	2	8	1	2.00	6	0	3.628	25.000	7.635
2	8.0	4	2	9	1	3.75	6.5	42	5.320	47.086	13.158
2	8.0	4	2	10	1	1.00	5	100	4.300	25.814	9.419
2	8.0	4	2	11	1	3.50	5	50	3.930	61.069	11.578
2	8.0	4	2	12	1	1.00	4.5	30	3.875	71.613	10.452
2	8.0	4	2	13	1	1.75	8.5	40	3.915	23.883	7.791
2	8.0	6	2	1	1	1.25	4	90	5.981	31.082	8.594
2	8.0	6	2	2	1	5.00	6	0	6.816	82.292	15.097
2	8.0	6	2	3	1	5.50	6.5	50	5.795	85.764	12.942
2	8.0	6	2	4	1	3.50	9	45	7.156	45.402	11.655
2	8.0	6	2	5	1	2.00	6	70	6.496	31.158	10.760
2	8.0	6	2	6	1	7.00	9	0	6.661	90.137	18.376
2	8.0	6	2	7	1	2.50	4	95	5.826	59.715	10.110
2	8.0	6	2	8	1	3.00	6	95	6.601	39.827	10.589
2	8.0	8	2	1	1	2.00	7	90	8.846	20.615	9.424
2	8.0	8	2	2	1	5.00	9	65	10.200	1 22.92	9.937
3	0.5	4	No	41	1	2.25	9	80	0.290	46.552	5.172
3	0.5	4	No	42	6	2.75	8.5	70	0.250	60.000	8.000
3	0.5	4	No	43	5	3.00	11	40	0.330	60.606	7.576
3	0.5	4	No	44	5	4.00	6	0	0.245	169.388	8.163
3	0.5	4	No	45	3	0.25	3	100	0.200	57.500	10.000
3	0.5	4	No	46	2	3.25	10	60	0.315	47.619	7.937
3	0.5	4	No	47	1	5.50	8	5	0.235	134.043	8.511
3	0.5	4	No	48	6	3.75	10	55	0.315	84.127	6.349
3	0.5	4	Yes	410	4	2.25	6	90	0.220	38.636	4.545
3	0.5	4	Yes	411	3	1.75	4.5	99	0.255	33.333	3.922
3	0.5	4	Yes	412	2	0.00	5	100	0.210	30.952	4.762
3	0.5	4	Yes	413	1	3.00	5	70	0.250	34.000	6.000
3	0.5	4	Yes	414	6	3.00	4	0	0.245	130.612	6.122
3	0.5	4	Yes	415	5	3.50	11	40	0.270	74.074	7.407
3	0.5	4	Yes	416	4	3.50	4	40	0.245	108.163	6.122
3	0.5	4	Yes	417	3	3.00	7.5	90	0.285	43.860	5.263
3	0.5	6	No	61	5	3.25	6.5	0	0.480	31.250	5.208
3	0.5	6	No	62	4	3.50	5.5	75	0.400	55.000	5.000
3	0.5	6	No	63	3	0.00	5.5	90	0.380	34.211	6.579

Table A1. (continued)

3	0.5	6	No	64	2	0.50	7.5	75	0.400	31.250	6.250
3	0.5	6	No	65	1	1.50	6	70	0.410	56.098	6.098
3	0.5	6	Yes	67	4	1.00	4.5	85	0.385	35.065	6.494
3	0.5	6	Yes	68	3	0.00	4	100	0.365	34.247	6.849
3	0.5	6	Yes	69	2	2.50	6.5	85	0.375	45.333	6.667
3	0.5	6	Yes	610	1	0.00	5	90	0.480	35.417	6.250
3	0.5	6	Yes	611	6	1.00	6.5	95	0.495	35.354	6.061
3	0.5	6	Yes	612	1	1.25	10	75	0.430	41.860	5.814
3	0.5	8	No	81	1	1.00	3.5	95	0.450	31.111	5.556
3	0.5	8	No	82	6	5.00	4	60	0.495	46.465	4.040
3	0.5	8	No	83	6	4.50	4	25	0.480	117.708	6.250
3	0.5	8	No	84	4	1.50	3	82	0.430	67.442	5.814
3	0.5	8	No	85	1	5.50	5	60	0.525	38.095	5.714
3	0.5	8	Yes	86	3	3.00	4.5	77	0.465	58.065	4.301
3	0.5	8	Yes	87	2	0.50	3	100	0.460	40.217	4.348
3	0.5	8	Yes	88	1	2.00	3.5	57	0.400	88.750	5.000
3	0.5	8	Yes	89	6	5.00	6.5	80	0.525	60.000	4.762
3	0.5	8	Yes	810	1	2.25	4	99	0.450	40.000	5.556
3	1.0	4	No	41	2	3.00	7.5	80	0.575	44.348	6.957
3	1.0	4	No	42	1	2.75	7.5	90	0.540	45.370	6.481
3	1.0	4	No	43	6	3.50	12	45	0.640	54.688	7.812
3	1.0	4	No	44	2	3.50	6	0	0.465	120.430	8.602
3	1.0	4	No	45	4	0.25	3	100	0.400	47.500	7.500
3	1.0	4	No	46	3	2.50	10	75	0.600	44.167	9.167
3	1.0	4	No	47	2	5.00	8	5	0.495	126.263	10.101
3	1.0	4	No	48	1	3.00	10	30	0.605	83.471	10.744
3	1.0	4	No	49	1	5.00	15	50	0.605	44.628	9.917
3	1.0	4	Yes	410	5	1.50	6	95	0.435	36.782	5.747
3	1.0	4	Yes	411	4	1.50	5	95	0.475	33.684	6.316
3	1.0	4	Yes	412	3	0.25	4.5	100	0.440	30.682	5.682
3	1.0	4	Yes	413	2	3.00	5	75	0.505	32.673	5.941
3	1.0	4	Yes	414	1	3.50	4	20	0.535	109.346	9.346
3	1.0	4	Yes	415	6	3.75	10	60	0.540	61.111	7.407
3	1.0	4	Yes	416	5	3.50	4	35	0.505	99.010	6.931
3	1.0	4	Yes	417	4	3.50	7	85	0.590	42.373	6.780
3	1.0	4	Yes	418	1	2.00	5	55	0.530	73.585	7.547
3	1.0	6	No	61	6	3.25	7	0	0.960	30.208	7.292
3	1.0	6	No	62	5	2.50	6.5	65	0.800	56.250	7.500
3	1.0	6	No	63	4	0.00	6	95	0.720	34.722	6.944
3	1.0	6	No	64	3	0.25	6	80	0.745	30.872	8.054
3	1.0	6	No	65	2	1.50	6	72	0.860	50.000	8.721
3	1.0	6	No	66	1	4.50	7.5	70	0.910	48.901	7.143
3	1.0	6	Yes	67	5	1.00	4	90	0.785	32.484	5.732
3	1.0	6	Yes	68	4	0.00	4	100	0.745	32.886	6.040
3	1.0	6	Yes	69	3	2.50	6	85	0.770	42.857	5.844
3	1.0	6	Yes	610	2	0.00	5.5	92	0.955	34.555	7.330
3	1.0	6	Yes	611	1	1.00	6	90	0.885	40.113	7.910
3	1.0	6	Yes	612	2	1.25	9.5	80	0.895	42.458	6.704

Table A1. (continued)

3	1.0	8	No	81	2	0.50	3.5	90	0.925	32.432	5.946
3	1.0	8	No	82	1	4.50	4.5	70	1.100	38.636	5.455
3	1.0	8	No	83	5	3.50	3	35	0.915	103.825	8.197
3	1.0	8	No	84	5	1.50	3.5	82	0.860	68.605	6.977
3	1.0	8	No	85	2	6.00	4.5	50	1.010	45.545	6.436
3	1.0	8	Yes	86	4	2.75	4	77	0.920	64.130	6.522
3	1.0	8	Yes	87	3	0.75	3	100	0.950	39.474	6.316
3	1.0	8	Yes	88	2	2.00	3	55	0.830	92.169	6.024
3	1.0	8	Yes	89	1	6.50	6	65	1.070	76.636	7.944
3	1.5	4	No	42	2	2.50	7	90	0.845	43.195	7.692
3	1.5	4	No	43	1	3.50	12	60	1.055	36.493	9.479
3	1.5	4	No	44	6	4.00	6	0	0.725	166.207	8.966
3	1.5	4	No	45	5	0.00	3	100	0.640	40.625	5.469
3	1.5	4	No	46	4	3.75	10	75	0.945	39.153	8.995
3	1.5	4	No	47	3	5.50	8	2	0.700	145.000	10.714
3	1.5	4	No	48	2	3.50	10	5	0.945	78.307	10.053
3	1.5	4	No	49	2	5.00	14	40	0.920	52.174	9.239
3	1.5	4	Yes	410	6	2.50	6	95	0.670	35.075	5.970
3	1.5	4	Yes	411	5	1.50	5	90	0.735	33.333	6.122
3	1.5	4	Yes	412	4	0.00	4.5	100	0.655	31.298	5.344
3	1.5	4	Yes	413	3	2.50	5	80	0.770	31.818	6.494
3	1.5	4	Yes	414	2	3.00	4	15	0.795	113.208	8.805
3	1.5	4	Yes	415	1	3.50	9	60	0.805	73.292	7.453
3	1.5	4	Yes	416	6	2.00	4	32	0.795	87.421	8.176
3	1.5	4	Yes	417	5	3.50	7.5	80	0.890	42.697	7.865
3	1.5	4	Yes	418	2	2.50	5	52	0.800	73.750	7.500
3	1.5	6	No	61	1	2.50	5	0	1.540	29.870	8.442
3	1.5	6	No	62	6	3.00	6	70	1.190	58.824	7.983
3	1.5	6	No	63	5	0.00	6	95	1.095	32.420	6.849
3	1.5	6	No	64	4	0.50	6.5	80	1.140	29.825	7.456
3	1.5	6	No	65	3	1.50	6	75	1.295	46.332	8.494
3	1.5	6	Yes	67	6	0.50	4.5	80	1.215	33.333	6.173
3	1.5	6	Yes	68	5	0.00	4.5	100	1.075	30.698	6.512
3	1.5	6	Yes	69	4	2.50	6	85	1.125	46.222	7.556
3	1.5	6	Yes	610	3	0.00	5	90	1.470	34.354	8.503
3	1.5	6	Yes	611	2	1.00	5	90	1.380	40.942	8.333
3	1.5	6	Yes	612	3	1.50	9	70	1.335	44.944	7.116
3	1.5	8	No	81	3	0.50	3.5	95	1.445	37.024	7.266
3	1.5	8	No	82	2	4.00	4	40	1.495	42.475	6.689
3	1.5	8	No	83	1	4.00	4	40	1.530	84.967	7.190
3	1.5	8	No	84	6	1.50	3	85	1.330	66.165	7.143
3	1.5	8	Yes	86	5	3.50	4.5	75	1.485	65.320	7.071
3	1.5	8	Yes	87	4	0.50	3	100	1.550	39.032	6.774
3	1.5	8	Yes	88	3	2.00	3	55	1.325	88.679	8.302
3	1.5	8	Yes	89	2	9.00	6	62	1.590	82.075	9.119
3	1.5	8	Yes	810	2	2.00	4	100	1.460	39.384	6.507
3	2.0	4	No	41	4	4.00	8	80	1.145	38.865	7.424
3	2.0	4	No	42	3	2.50	7	80	1.085	45.161	8.756

Table A1. (continued)

3	2.0	4	No	43	2	4.00	12	60	1.430	34.965	8.741
3	2.0	4	No	44	1	3.50	6	0	0.975	116.923	9.231
3	2.0	4	No	45	6	0.00	3.5	100	0.855	37.427	5.848
3	2.0	4	No	46	5	2.50	9	80	1.240	38.306	8.065
3	2.0	4	No	47	4	5.00	8	5	1.000	130.500	10.500
3	2.0	4	No	48	3	3.25	10	50	1.270	79.528	10.630
3	2.0	4	No	49	3	5.00	13	40	1.225	52.653	9.388
3	2.0	4	Yes	410	1	1.50	7	95	0.865	32.370	6.936
3	2.0	4	Yes	411	6	2.00	7.5	80	1.125	31.111	7.111
3	2.0	4	Yes	412	5	0.00	4.5	100	0.850	30.588	5.882
3	2.0	4	Yes	413	4	2.75	5	90	1.035	30.918	7.246
3	2.0	4	Yes	414	3	3.50	4	15	1.130	105.310	8.407
3	2.0	4	Yes	415	2	3.75	11	50	1.115	69.955	8.520
3	2.0	4	Yes	416	1	3.00	4	10	0.880	132.386	9.091
3	2.0	4	Yes	417	6	3.50	8	80	1.215	46.914	7.407
3	2.0	6	No	61	2	2.50	6	0	1.935	29.457	8.269
3	2.0	6	No	62	1	3.50	6	80	1.640	52.134	7.927
3	2.0	6	No	63	6	0.00	5	95	1.505	30.897	7.641
3	2.0	6	No	64	5	0.50	7	95	1.470	29.252	7.143
3	2.0	6	No	65	4	0.50	6	85	1.730	41.618	8.960
3	2.0	6	No	66	2	4.00	8	68	1.830	48.087	8.743
3	2.0	6	Yes	67	1	1.00	4.5	90	1.640	32.927	7.012
3	2.0	6	Yes	68	6	0.00	4	100	1.510	31.126	6.623
3	2.0	6	Yes	69	5	3.00	7	80	1.540	46.753	6.818
3	2.0	6	Yes	610	4	0.00	5.5	95	1.945	30.077	8.997
3	2.0	6	Yes	611	3	1.00	5	85	1.830	38.525	8.197
3	2.0	8	No	81	4	0.50	4	95	1.865	36.997	7.239
3	2.0	8	No	82	3	4.50	4	50	1.935	43.411	7.235
3	2.0	8	No	83	2	4.50	4	45	2.000	86.000	9.000
3	2.0	8	No	84	1	1.50	3	65	1.685	92.285	7.715
3	2.0	8	Yes	86	6	2.50	4	75	1.900	68.947	7.632
3	2.0	8	Yes	87	5	0.50	3	100	1.940	38.144	7.474
3	2.0	8	Yes	88	4	0.50	3	65	1.670	92.515	8.084
3	2.0	8	Yes	89	3	8.00	5.5	65	2.190	72.603	7.991
3	2.0	8	Yes	810	3	2.00	4	100	1.985	39.295	6.549
3	2.5	4	No	41	5	2.25	6	90	1.335	38.577	9.738
3	2.5	4	No	42	4	2.25	8	80	1.335	43.071	7.865
3	2.5	4	No	43	3	4.00	12	40	1.760	42.330	9.091
3	2.5	4	No	44	3	4.00	5.5	0	1.265	132.016	10.672
3	2.5	4	No	45	1	0.00	3	100	1.105	38.914	5.430
3	2.5	4	No	46	6	5.00	10	75	1.545	37.864	8.091
3	2.5	4	No	47	5	5.75	8	10	1.270	113.780	9.055
3	2.5	4	No	48	4	4.00	9	50	1.660	61.747	9.940
3	2.5	4	Yes	410	2	2.00	6	95	1.110	35.135	6.757
3	2.5	4	Yes	411	6	0.00	4	100	1.050	29.524	5.714
3	2.5	4	Yes	411	1	2.00	4	100	1.240	32.258	6.048
3	2.5	4	Yes	413	5	3.00	6	80	1.345	30.855	7.435
3	2.5	4	Yes	414	4	3.00	4	10	1.300	123.846	10.385

Table A1. (continued)

3	2.5	4	Yes	415	3	2.25	14	45	1.335	82.397	9.363
3	2.5	4	Yes	416	2	3.50	4.5	15	1.120	124.554	8.929
3	2.5	4	Yes	417	1	4.00	10	45	1.470	57.823	8.503
3	2.5	4	Yes	418	3	3.50	5	65	1.020	59.314	7.353
3	2.5	6	No	61	3	4.00	5	0	2.420	28.926	8.678
3	2.5	6	No	62	2	3.00	6.5	75	1.970	52.792	7.868
3	2.5	6	No	63	1	0.00	6	90	1.955	31.458	9.974
3	2.5	6	No	64	6	0.50	6	95	1.870	29.679	7.487
3	2.5	6	No	65	5	0.50	6	95	2.255	35.033	8.426
3	2.5	6	No	66	3	4.50	7.5	70	2.330	42.489	9.871
3	2.5	6	Yes	67	2	1.00	4.5	90	2.025	32.099	7.407
3	2.5	6	Yes	68	1	0.00	4	100	1.845	31.436	7.046
3	2.5	6	Yes	69	6	3.00	6.5	78	1.905	48.294	7.087
3	2.5	6	Yes	610	5	0.00	5.5	99	2.480	28.427	9.073
3	2.5	6	Yes	611	4	1.25	5	85	2.350	36.596	8.723
3	2.5	6	Yes	612	4	1.50	9.5	70	2.150	49.767	7.674
3	2.5	8	No	81	5	0.00	4	99	2.380	36.555	7.353
3	2.5	8	No	82	4	5.00	4.5	70	2.615	48.566	6.310
3	2.5	8	No	83	3	3.50	4	42	2.510	90.239	7.769
3	2.5	8	No	84	2	2.00	3	68	2.195	88.610	8.656
3	2.5	8	No	85	3	6.00	4.5	35	2.685	41.341	6.890
3	2.5	8	Yes	86	1	4.00	5	75	2.385	62.055	6.918
3	2.5	8	Yes	87	6	0.50	3.5	100	2.520	38.294	7.143
3	2.5	8	Yes	88	5	1.75	3	67	2.145	91.142	8.625
3	2.5	8	Yes	89	4	9.00	5.5	80	2.755	55.717	8.530
3	3.5	4	No	41	6	2.75	6	95	1.980	35.859	7.071
3	3.5	4	No	42	5	1.75	8	85	1.860	45.430	7.258
3	3.5	4	No	43	4	3.50	12	40	2.465	45.030	9.736
3	3.5	4	No	44	4	3.50	6	0	1.780	151.404	10.393
3	3.5	4	No	45	2	0.00	3	100	1.530	37.255	5.882
3	3.5	4	No	46	1	3.50	9	70	2.215	34.763	7.901
3	3.5	4	No	47	6	4.50	8	50	1.785	73.669	8.683
3	3.5	4	No	48	5	3.50	8	70	2.300	67.609	9.348
3	3.5	4	No	49	4	5.50	12	40	2.110	52.844	9.005
3	3.5	4	Yes	410	3	2.25	6	95	1.605	34.268	6.854
3	3.5	4	Yes	411	2	2.75	3.5	95	1.695	32.448	6.195
3	3.5	4	Yes	412	1	0.00	6	100	1.590	30.189	6.289
3	3.5	4	Yes	413	6	2.00	5	70	1.860	31.183	7.258
3	3.5	4	Yes	414	5	4.00	4	5	1.780	125.281	9.270
3	3.5	4	Yes	415	4	3.50	13	40	1.930	83.161	9.067
3	3.5	4	Yes	416	3	4.50	4	40	1.860	105.645	7.796
3	3.5	4	Yes	417	2	2.50	8	80	2.080	42.548	8.173
3	3.5	4	Yes	418	4	3.00	4.5	90	1.750	42.000	6.857
3	3.5	6	No	61	4	3.50	7	0	3.310	28.550	8.006
3	3.5	6	No	62	3	4.00	6.5	75	2.805	54.189	8.378
3	3.5	6	No	63	2	0.00	6	97	2.690	32.342	7.807
3	3.5	6	No	64	1	1.25	6.5	70	2.855	29.947	7.531
3	3.5	6	No	65	6	0.50	5	95	3.305	31.770	9.834

Table A1. (continued)

3	3.5	6	No	66	4	3.50	7.5	75	3.325	42.556	9.023
3	3.5	6	Yes	67	3	1.00	4.5	90	2.830	31.272	7.597
3	3.5	6	Yes	68	2	0.00	4	100	2.585	29.981	6.190
3	3.5	6	Yes	69	1	3.25	7	15	2.815	37.300	7.105
3	3.5	6	Yes	610	6	0.00	5	85	3.570	27.171	9.524
3	3.5	6	Yes	611	5	2.00	5.5	90	3.480	32.615	8.621
3	3.5	6	Yes	612	5	1.50	10	75	3.000	51.000	7.167
3	3.5	8	No	81	6	0.00	4	95	3.290	36.170	7.599
3	3.5	8	No	82	5	4.50	4	70	3.645	49.657	6.996
3	3.5	8	No	83	4	3.50	3.5	30	3.415	101.171	8.053
3	3.5	8	No	84	3	2.50	3	70	3.120	73.558	9.776
3	3.5	8	Yes	86	2	4.00	5	82	3.410	54.692	7.625
3	3.5	8	Yes	87	1	0.75	3.5	100	3.360	37.500	7.143
3	3.5	8	Yes	88	6	2.00	3	55	3.025	94.050	9.091
3	3.5	8	Yes	89	5	7.00	6	85	3.860	54.404	9.197
3	8.0	4	2	1	1	3.50	15	70	4.505	46.615	7.991
3	8.0	4	2	2	1	2.50	11	50	4.655	36.627	8.593
3	8.0	4	2	3	1	1.50	6	60	4.290	41.492	7.925
3	8.0	4	2	4	1	3.00	8	40	4.355	74.856	9.644
3	8.0	4	2	5	1	2.50	7	100	4.010	31.671	7.855
3	8.0	4	2	6	1	0.00	3.5	95	3.975	36.352	7.296
3	8.0	4	2	7	1	0.00	4	25	3.800	58.553	8.158
3	8.0	4	2	8	1	4.00	14	60	3.935	77.382	9.276
3	8.0	4	2	9	1	0.00	6	100	3.910	30.307	7.545
3	8.0	4	2	10	1	1.75	6	75	3.640	52.060	7.692
3	8.0	4	2	11	1	3.00	3	95	3.590	73.259	7.242
3	8.0	4	2	12	1	2.00	4	60	4.125	61.818	8.364
3	8.0	4	2	13	1	2.50	3	75	3.855	107.523	8.171
3	8.0	6	2	1	1	3.50	2.75	10	6.685	124.159	10.621
3	8.0	6	2	2	1	4.00	3.5	0	6.145	89.097	8.869
3	8.0	6	2	3	1	0.50	4.5	95	6.565	48.363	8.225
3	8.0	6	2	4	1	3.50	4	20	6.510	120.737	12.366
3	8.0	6	2	5	1	4.00	4	20	6.525	93.870	11.724
3	8.0	6	2	6	1	1.00	3	60	5.840	76.455	8.476
3	8.0	6	2	7	1	0.00	5	90	6.245	48.439	9.528
3	8.0	6	2	8	1	0.00	3.5	83	6.320	47.310	8.070
3	8.0	8	2	1	1	10.00	6	20	11.050	0 74.48	10.633
3	8.0	8	2	2	1	10.00	10	15	9.265	103.562	11.657
3	8.0	8	2	3	1	5.50	13	0	9.730	30.781	10.997
3	8.0	8	2	4	1	3.00	6	40	9.725	28.535	9.306
3	8.0	8	2	5	1	3.00	10.5	20	8.995	43.302	8.949
3	8.0	8	2	6	1	3.50	7	70	9.540	34.591	8.281
4	0.5	4	No	41	2	2.75	7.5	30	0.250	82.000	10.000
4	0.5	4	No	42	1	2.25	4.5	60	0.240	50.000	4.167
4	0.5	4	No	43	6	1.50	3	50	0.250	84.000	6.000
4	0.5	4	No	44	5	1.00	3	100	0.230	34.783	6.522
4	0.5	4	No	45	4	1.25	5	100	0.245	53.061	8.163
4	0.5	4	No	46	3	3.00	3	10	0.250	116.000	8.000

Table A1. (continued)

4	0.5	4	No	47	2	0.00	5	100	0.210	26.190	4.762
4	0.5	4	No	48	1	1.50	4	80	0.255	33.333	5.882
4	0.5	4	Yes	410	1	2.00	3	40	0.250	82.000	4.000
4	0.5	4	Yes	411	6	1.75	3	62	0.225	53.333	4.444
4	0.5	4	Yes	412	5	2.50	4	10	0.250	130.000	6.000
4	0.5	4	Yes	413	4	2.00	3.5	20	0.235	112.766	6.383
4	0.5	4	Yes	414	3	3.00	6	45	0.280	83.929	5.357
4	0.5	4	Yes	415	2	1.25	4	100	0.245	30.612	4.082
4	0.5	4	Yes	416	1	1.50	4.5	100	0.250	30.000	6.000
4	0.5	4	Yes	417	6	2.50	13	20	0.250	96.000	4.000
4	0.5	6	No	61	3	3.25	5	75	0.445	52.809	6.742
4	0.5	6	No	62	2	0.00	3	100	0.415	37.349	8.434
4	0.5	6	No	63	1	0.75	3.5	95	0.475	32.632	7.368
4	0.5	6	No	64	6	0.50	4	100	0.410	30.488	4.878
4	0.5	6	No	65	5	0.00	4	100	0.385	36.364	7.792
4	0.5	6	No	66	3	1.50	8.5	85	0.440	32.955	6.818
4	0.5	6	Yes	67	1	2.25	8	70	0.490	30.612	5.102
4	0.5	6	Yes	68	6	0.50	4	100	0.445	26.966	5.618
4	0.5	6	Yes	69	5	1.25	4	90	0.395	26.582	3.797
4	0.5	6	Yes	610	4	4.00	6	60	0.420	29.762	5.952
4	0.5	6	Yes	611	2	2.00	5	5	0.455	28.571	5.495
4	0.5	8	No	81	1	2.00	4	80	0.455	46.154	4.396
4	0.5	8	No	82	6	4.50	3	75	0.430	36.047	4.651
4	0.5	8	No	83	5	3.75	5	100	0.525	33.333	4.762
4	0.5	8	No	84	5	3.50	3	100	0.500	32.000	5.000
4	0.5	8	Yes	86	2	5.50	3	50	0.570	29.825	4.386
4	0.5	8	Yes	87	1	0.25	3	100	0.435	32.184	3.448
4	0.5	8	Yes	88	6	7.00	4	60	0.465	46.237	4.301
4	0.5	8	Yes	89	6	3.25	4.5	100	0.560	31.250	4.464
4	1.0	4	No	41	3	2.75	6.5	30	0.515	75.728	8.738
4	1.0	4	No	42	2	2.25	4.5	55	0.470	56.383	6.383
4	1.0	4	No	43	1	1.00	3	75	0.510	59.804	7.843
4	1.0	4	No	44	6	0.75	3.5	100	0.475	31.579	6.316
4	1.0	4	No	45	5	2.50	4.5	95	0.500	28.000	6.000
4	1.0	4	No	46	4	4.00	3	10	0.515	105.825	9.709
4	1.0	4	No	47	3	0.00	5.5	100	0.440	25.000	4.545
4	1.0	4	No	48	2	2.00	4	85	0.545	32.110	9.174
4	1.0	4	No	49	4	2.50	7	70	0.560	33.929	8.929
4	1.0	4	Yes	410	2	1.25	2.5	40	0.495	69.697	6.061
4	1.0	4	Yes	411	1	1.50	3	70	0.475	51.579	7.368
4	1.0	4	Yes	412	6	3.50	4	5	0.500	123.000	7.000
4	1.0	4	Yes	413	5	2.50	3.5	20	0.460	103.261	7.609
4	1.0	4	Yes	414	4	2.50	6.5	45	0.560	85.714	8.036
4	1.0	4	Yes	415	3	1.25	4.5	100	0.495	32.323	7.071
4	1.0	4	Yes	416	2	2.25	4.5	100	0.515	27.184	5.825
4	1.0	4	Yes	417	1	1.50	11	22	0.550	88.182	9.091
4	1.0	6	No	61	4	3.00	6	75	0.895	50.279	7.263
4	1.0	6	No	62	3	0.00	3	100	0.835	33.533	7.784

Table A1. (continued)

4	1.0	6	No	63	2	1.00	3.5	90	0.955	30.890	7.330
4	1.0	6	No	64	1	0.50	4	95	0.840	30.357	7.738
4	1.0	6	No	65	6	0.00	3.5	100	0.755	30.464	7.285
4	1.0	6	No	66	4	2.00	7	90	0.810	28.395	6.790
4	1.0	6	Yes	67	2	2.00	8	70	0.955	30.366	7.330
4	1.0	6	Yes	68	1	0.25	4	100	0.885	25.424	7.345
4	1.0	6	Yes	69	6	0.50	4	90	0.775	27.742	5.806
4	1.0	6	Yes	610	5	2.50	5.5	60	0.840	28.571	6.548
4	1.0	6	Yes	611	3	3.00	5	5	0.895	27.933	6.704
4	1.0	6	Yes	612	1	1.00	3	100	0.770	28.571	6.494
4	1.0	8	No	81	2	1.50	4	80	0.895	45.810	6.145
4	1.0	8	No	82	1	5.00	3.5	70	0.905	57.459	4.972
4	1.0	8	No	83	6	3.50	4.5	100	1.010	33.663	6.931
4	1.0	8	No	84	6	2.50	3	100	0.885	32.768	5.650
4	1.0	8	Yes	86	3	4.50	3.5	30	1.145	32.314	5.677
4	1.0	8	Yes	87	2	0.00	3.5	100	0.825	29.697	4.242
4	1.0	8	Yes	88	1	4.50	4	80	0.915	34.973	4.372
4	1.0	8	Yes	89	1	8.00	5	90	1.100	31.818	4.545
4	1.5	4	No	41	4	2.00	6.5	35	0.765	67.974	8.497
4	1.5	4	No	42	3	2.00	4.5	52	0.710	60.563	7.746
4	1.5	4	No	43	2	2.00	3	65	0.765	60.784	8.497
4	1.5	4	No	44	1	2.25	4	95	0.800	33.125	6.875
4	1.5	4	No	45	6	3.00	5	100	0.775	27.742	7.097
4	1.5	4	No	46	5	3.75	3	15	0.745	117.450	11.409
4	1.5	4	No	47	4	0.00	5	100	0.640	26.563	5.469
4	1.5	4	No	48	3	1.50	3.5	95	0.825	31.515	6.061
4	1.5	4	No	49	3	2.75	8	65	0.850	34.706	8.235
4	1.5	4	Yes	410	3	2.50	2	40	0.720	84.722	15.278
4	1.5	4	Yes	411	2	2.00	3	65	0.730	48.630	7.534
4	1.5	4	Yes	412	1	3.00	4	1	0.685	132.847	9.489
4	1.5	4	Yes	413	6	2.00	3	35	0.800	80.625	6.250
4	1.5	4	Yes	414	5	2.75	6	45	0.875	74.857	7.429
4	1.5	4	Yes	415	4	1.75	4	100	0.780	29.487	7.051
4	1.5	4	Yes	416	3	1.75	4	100	0.790	27.215	6.329
4	1.5	4	Yes	417	2	2.25	12.5	22	0.835	85.629	10.180
4	1.5	6	No	61	5	5.00	6	70	1.385	47.653	8.664
4	1.5	6	No	62	4	0.00	3	100	1.250	31.600	8.000
4	1.5	6	No	63	3	0.50	3	90	1.405	29.181	8.185
4	1.5	6	No	64	2	0.50	4	95	1.265	28.854	7.115
4	1.5	6	No	65	1	0.00	3.5	100	1.190	28.571	7.563
4	1.5	6	No	66	5	1.75	6	85	1.245	27.711	6.827
4	1.5	6	Yes	67	3	0.50	7.5	75	1.500	27.667	7.000
4	1.5	6	Yes	68	3	1.00	4	100	1.405	24.199	6.406
4	1.5	6	Yes	69	1	1.00	3	85	1.280	27.344	7.031
4	1.5	6	Yes	610	6	0.75	5	70	1.300	28.077	6.923
4	1.5	6	Yes	611	4	3.00	5	10	1.460	27.055	6.849
4	1.5	8	No	81	3	1.25	3.5	80	1.405	46.619	6.762
4	1.5	8	No	82	2	5.00	3.5	70	1.325	59.245	6.415

Table A1. (continued)

4	1.5	8	No	83	1	3.50	4.5	100	1.525	31.803	5.902
4	1.5	8	No	84	4	3.25	3	100	1.460	31.507	5.479
4	1.5	8	No	85	1	5.00	3.5	100	1.305	28.736	4.598
4	1.5	8	Yes	86	4	5.00	3.5	35	1.740	38.793	6.322
4	1.5	8	Yes	87	3	0.00	3	100	1.245	29.317	5.622
4	1.5	8	Yes	88	2	5.00	4.5	85	1.425	38.596	4.912
4	1.5	8	Yes	89	2	8.00	3.5	100	1.615	28.483	5.573
4	1.5	8	Yes	810	1	2.50	4	100	1.690	28.402	6.509
4	2.0	4	No	41	5	4.00	7	45	1.000	70.500	8.500
4	2.0	4	No	42	4	2.25	4	40	0.960	63.542	8.333
4	2.0	4	No	43	3	2.50	3	65	1.075	57.209	8.372
4	2.0	4	No	44	2	1.00	4.5	90	1.165	35.193	6.438
4	2.0	4	No	45	1	2.00	6	90	1.070	27.103	7.944
4	2.0	4	No	46	6	3.50	3	10	1.015	116.749	9.852
4	2.0	4	No	47	5	0.00	5	100	0.805	26.087	6.211
4	2.0	4	No	48	4	1.00	4	100	1.075	28.372	6.977
4	2.0	4	No	49	2	3.50	7.5	65	1.140	38.158	7.895
4	2.0	4	Yes	410	4	2.50	2.5	45	1.000	78.000	9.000
4	2.0	4	Yes	411	3	2.00	2.5	70	1.020	44.118	7.353
4	2.0	4	Yes	412	2	3.50	4	0	0.980	117.857	8.673
4	2.0	4	Yes	413	1	3.00	3	45	1.035	67.633	7.246
4	2.0	4	Yes	414	6	3.50	6.5	30	1.155	77.489	9.957
4	2.0	4	Yes	415	5	2.50	4.5	100	1.005	28.856	6.965
4	2.0	4	Yes	416	4	1.75	4	100	1.060	26.887	6.604
4	2.0	4	Yes	417	3	2.00	11	35	1.100	88.636	10.455
4	2.0	4	Yes	418	1	2.50	5.5	0	1.175	83.830	9.362
4	2.0	6	No	61	6	3.50	5.5	75	1.855	39.892	7.817
4	2.0	6	No	62	5	0.00	3	100	1.675	30.149	7.463
4	2.0	6	No	63	4	0.50	3.5	90	1.830	29.235	7.377
4	2.0	6	No	64	3	1.00	3.5	100	1.770	28.531	7.062
4	2.0	6	No	65	2	0.00	3.5	100	1.610	27.640	6.832
4	2.0	6	Yes	67	4	1.50	7.5	80	1.910	26.702	7.330
4	2.0	6	Yes	68	2	0.00	4	100	1.820	23.626	7.418
4	2.0	6	Yes	69	2	0.25	3.5	90	1.670	26.347	6.886
4	2.0	6	Yes	610	1	2.75	5	65	1.900	26.579	7.632
4	2.0	6	Yes	611	5	2.25	5.5	0	1.905	26.772	7.349
4	2.0	6	Yes	612	2	0.75	3	100	1.630	26.687	5.828
4	2.0	8	No	81	4	1.75	4	85	1.895	45.119	7.388
4	2.0	8	No	82	3	6.00	3.5	90	1.785	51.261	5.882
4	2.0	8	No	83	2	4.00	5	100	1.945	33.162	6.170
4	2.0	8	No	84	1	1.00	3.5	95	1.680	31.250	5.655
4	2.0	8	Yes	86	5	4.50	3.5	35	2.285	50.328	7.221
4	2.0	8	Yes	87	4	0.00	3	100	1.805	30.194	5.817
4	2.0	8	Yes	88	3	6.00	5	70	1.875	45.333	5.867
4	2.0	8	Yes	89	5	7.50	3.5	100	2.125	28.941	5.882
4	2.5	4	No	41	6	4.00	6	50	1.265	60.079	8.696
4	2.5	4	No	42	5	2.00	4	45	1.180	61.441	8.475
4	2.5	4	No	43	4	2.75	3	65	1.330	62.406	7.895

Table A1. (continued)

4	2.5	4	No	44	3	1.25	4	90	1.290	31.783	7.364
4	2.5	4	No	45	2	1.50	5.5	95	1.325	26.792	7.547
4	2.5	4	No	46	1	4.50	3.5	10	1.285	118.288	11.284
4	2.5	4	No	47	6	0.50	4	100	1.050	24.762	5.714
4	2.5	4	No	48	5	1.00	4	100	1.220	27.869	6.967
4	2.5	4	Yes	410	5	2.25	3	45	1.245	78.313	8.032
4	2.5	4	Yes	411	4	2.00	3	70	1.255	49.004	7.968
4	2.5	4	Yes	412	3	3.00	4	1	1.170	131.624	9.402
4	2.5	4	Yes	413	2	2.50	3	40	1.225	87.755	8.571
4	2.5	4	Yes	414	1	2.00	6	5	1.335	85.019	10.112
4	2.5	4	Yes	415	6	1.75	4.5	100	1.320	28.409	7.576
4	2.5	4	Yes	416	5	2.00	4.5	100	1.380	28.623	7.971
4	2.5	4	Yes	417	4	1.75	11.5	30	1.380	90.942	10.870
4	2.5	4	Yes	418	2	4.50	6	5	1.470	94.898	10.544
4	2.5	6	No	61	1	3.50	4.5	70	2.215	42.438	8.352
4	2.5	6	No	62	6	0.00	3.5	100	2.095	29.594	7.637
4	2.5	6	No	63	5	0.50	3	100	2.285	29.103	7.221
4	2.5	6	No	64	4	1.00	4	95	2.105	28.504	6.651
4	2.5	6	No	65	3	0.00	3.5	100	1.960	28.061	6.888
4	2.5	6	No	66	1	1.50	7	70	2.100	24.762	6.429
4	2.5	6	Yes	67	5	1.75	8	85	2.370	27.215	7.384
4	2.5	6	Yes	68	4	0.00	4	100	2.330	24.034	7.511
4	2.5	6	Yes	69	3	0.75	3.5	85	2.105	26.603	6.651
4	2.5	6	Yes	610	2	2.25	7	60	2.375	25.895	6.947
4	2.5	6	Yes	611	6	2.00	6	5	2.510	27.291	7.171
4	2.5	6	Yes	612	3	1.00	3	100	1.960	26.786	6.122
4	2.5	8	No	81	5	2.00	4.5	78	2.475	45.051	7.273
4	2.5	8	No	82	4	4.00	3.5	95	2.385	42.977	5.660
4	2.5	8	No	83	3	4.50	5	100	2.490	34.538	6.426
4	2.5	8	No	84	2	1.00	3.5	95	2.110	32.701	5.213
4	2.5	8	No	85	2	5.50	3.5	100	2.090	30.622	4.785
4	2.5	8	Yes	86	6	6.00	3.5	40	2.830	51.060	7.244
4	2.5	8	Yes	87	5	0.00	3	100	2.280	29.825	5.921
4	2.5	8	Yes	88	4	6.50	5	60	2.330	48.712	6.223
4	2.5	8	Yes	89	4	6.00	4	100	2.715	29.282	5.709
4	2.5	8	Yes	810	2	3.50	3.5	100	2.785	29.803	6.643
4	3.5	4	No	41	1	2.50	6	45	1.845	69.377	10.840
4	3.5	4	No	42	6	2.00	4	55	1.715	55.394	8.163
4	3.5	4	No	43	5	2.00	3	60	1.820	66.484	8.516
4	3.5	4	No	44	4	1.00	3.5	100	1.805	30.748	7.756
4	3.5	4	No	45	3	3.50	5	100	1.790	27.933	7.542
4	3.5	4	No	46	2	3.75	3	10	1.885	101.061	10.345
4	3.5	4	No	47	1	0.00	5	100	1.560	25.000	5.769
4	3.5	4	No	48	6	1.25	4	100	1.730	28.613	6.936
4	3.5	4	No	49	1	3.00	7	90	2.000	31.750	7.750
4	3.5	4	Yes	410	6	2.50	3	30	1.795	68.524	8.078
4	3.5	4	Yes	411	5	1.50	3	62	1.715	55.394	8.163
4	3.5	4	Yes	412	4	4.00	4.5	5	1.740	127.586	10.345

Table A1. (continued)

4	3.5	4	Yes	413	3	2.50	3.5	20	1.750	100.000	10.571
4	3.5	4	Yes	414	2	4.00	6	15	1.995	82.957	10.276
4	3.5	4	Yes	415	1	1.50	4.5	95	1.825	26.027	6.849
4	3.5	4	Yes	416	6	2.25	4.5	100	1.910	26.963	6.806
4	3.5	4	Yes	417	5	1.25	12	25	1.850	91.622	11.351
4	3.5	4	Yes	418	3	4.50	7	15	2.025	98.765	10.864
4	3.5	6	No	61	2	3.50	4	75	3.190	41.379	7.994
4	3.5	6	No	62	1	0.00	3.5	100	3.040	28.125	7.401
4	3.5	6	No	63	6	1.00	3.5	100	3.230	28.328	6.811
4	3.5	6	No	64	5	0.50	4	100	2.965	28.162	6.745
4	3.5	6	No	65	4	0.00	4	100	2.760	27.355	6.522
4	3.5	6	No	66	2	2.00	6	80	3.130	25.080	6.230
4	3.5	6	Yes	67	6	2.00	7	80	3.345	30.643	7.474
4	3.5	6	Yes	68	5	0.25	4	99	3.260	23.466	7.669
4	3.5	6	Yes	69	4	1.00	3.5	90	2.920	26.199	6.507
4	3.5	6	Yes	610	3	2.75	6	50	3.225	26.822	7.442
4	3.5	6	Yes	611	1	2.25	5	5	3.425	25.255	7.445
4	3.5	6	Yes	612	4	0.75	4	100	2.910	26.460	6.357
4	3.5	8	No	81	6	2.25	5	75	3.495	46.209	7.439
4	3.5	8	No	82	5	5.00	3.5	75	3.250	44.462	6.000
4	3.5	8	No	83	4	4.50	5	100	3.680	33.288	6.250
4	3.5	8	No	84	3	2.50	3	100	3.230	32.508	6.037
4	3.5	8	Yes	86	1	5.00	3.5	50	3.990	29.574	6.642
4	3.5	8	Yes	87	6	0.00	3	100	3.300	31.212	5.909
4	3.5	8	Yes	88	5	5.50	5	55	3.335	52.474	6.747
4	3.5	8	Yes	89	5	4.50	4	100	3.965	29.004	6.431
4	8.0	4	2	1	1	0.50	3.5	80	3.970	37.406	5.919
4	8.0	4	2	2	1	3.00	7.5	45	4.315	50.985	7.879
4	8.0	4	2	3	1	1.50	6	50	3.805	36.794	6.833
4	8.0	4	2	4	1	1.50	8.5	20	3.850	95.455	10.649
4	8.0	4	2	5	1	0.50	5	90	4.115	25.152	6.926
4	8.0	4	2	6	1	2.50	19	25	3.925	63.185	8.662
4	8.0	4	2	7	1	0.50	6	95	4.070	41.155	7.371
4	8.0	4	2	8	1	0.00	5	100	3.610	30.332	6.371
4	8.0	4	2	9	1	0.75	5	95	3.915	32.056	7.024
4	8.0	4	2	10	1	2.00	8	55	4.440	53.604	8.221
4	8.0	4	2	11	1	1.50	6	85	4.360	38.991	6.995
4	8.0	4	2	12	1	5.00	6	10	4.420	86.991	9.615
4	8.0	4	2	13	1	2.25	5.5	75	3.800	42.368	5.921
4	8.0	6	2	1	1	0.00	4	100	7.040	24.574	6.889
4	8.0	6	2	2	1	0.50	2.5	80	6.880	36.192	7.849
4	8.0	6	2	3	1	0.00	3.5	95	5.985	37.093	6.934
4	8.0	6	2	4	1	2.75	3.5	75	7.715	54.439	9.203
4	8.0	6	2	5	1	2.50	7	35	6.130	103.915	10.604
4	8.0	6	2	6	1	5.50	13	30	6.820	56.672	8.578
4	8.0	6	2	7	1	3.00	8.5	75	8.105	39.297	8.267
4	8.0	6	2	8	1	0.00	5	100	6.310	30.032	6.498
4	8.0	8	2	1	1	9.00	4	1	8.750	34.514	5.886

Table A1. (continued)

4	8.0	8	2	2	1	1.50	3.5	100	8.865	26.791	6.430
4	8.0	8	2	3	1	4.50	3.5	95	10.030	0 24.72	6.132
4	8.0	8	2	4	1	0.50	5	75	8.890	29.640	7.480
4	8.0	8	2	5	1	10.00	11	45	9.300	68.817	9.839
4	8.0	8	2	6	1	5.00	4.5	30	10.810	0 54.62	8.279

Table A2. Complete data set for the Charge Formation Schemes phase. Lengths are in inches, heartwood as a percentage and inital and final moisture content percentage on a dry basis. The hyphenated combination of charge and number creates a unique code for each board.

Charge	Sample	Length	Heart	Width	OD Wt.	MC_i	MC_f
Rack 1	1	24	0	6	1.655	103.927	20.846
Rack 1	2	8	100	6	0.520	28.846	8.654
Rack 1	3	16	50	6	1.075	67.907	14.884
Rack 1	4	14	100	6	0.935	27.273	10.695
Rack 1	5	18	15	6	1.160	92.241	17.672
Rack 1	6	16	40	6	1.025	77.073	14.634
Rack 1	7	24	0	6	1.465	117.406	26.280
Rack 1	8	23	0	6	1.740	51.437	13.793
Rack 1	9	24	0	6	1.415	91.873	24.382
Rack 1	10	24	40	6	1.625	80.308	17.846
Rack 1	11	24	25	6	1.515	83.168	22.772
Rack 1	12	7	60	6	0.520	48.077	15.385
Rack 1	13	24	90	6	1.385	40.072	10.830
Rack 1	14	24	75	6	1.590	42.453	12.893
Rack 1	15	24	15	6	1.440	79.861	22.569
Rack 1	16	24	75	6	1.925	101.299	21.039
Rack 1	17	24	5	6	1.310	133.588	27.099
Rack 1	18	24	0	6	1.525	101.311	21.311
Rack 1	19	24	5	6	1.465	59.044	16.041
Rack 1	20	24	60	6	1.605	63.551	22.430
Rack 1	21	24	0	6	1.850	105.676	25.946
Rack 1	22	19	0	6	1.445	104.152	22.837
Rack 1	23	24	25	6	1.425	82.807	18.246
Rack 1	24	24	40	6	1.680	55.357	15.476
Rack 1	25	24	10	6	1.475	120.339	25.085
Rack 1	26	24	65	6	1.430	56.993	13.287
Rack 1	27	24	50	6	1.665	51.652	15.315
Rack 1	28	24	55	6	1.780	55.337	15.730
Rack 1	29	24	5	6	1.505	111.960	20.266
Rack 1	30	24	25	6	1.630	59.509	14.724
Rack 1	31	22	75	6	1.700	43.529	10.294
Rack 1	32	24	10	6	1.660	66.265	12.952

Table A2. (continued)

Rack 1	33	18	5	6	1.275	78.431	17.647
Rack 1	34	24	80	6	1.450	54.138	12.069
Rack 1	35	24	50	6	1.445	77.509	14.187
Rack 1	36	13	80	6	0.845	38.462	10.651
Rack 1	37	24	30	6	1.510	41.060	10.265
Rack 1	38	15	20	6	0.895	30.726	9.497
Rack 1	39	24	75	6	1.360	59.926	13.235
Rack 1	40	18	100	6	1.320	22.727	7.576
Rack 1	41	17	0	6	1.295	77.606	17.375
Rack 1	42	15	60	6	0.885	62.147	12.994
Rack 1	43	11	10	6	0.730	101.370	15.753
Rack 1	44	24	60	6	1.650	58.485	16.970
Rack 1	45	12	100	6	0.790	29.114	10.759
Rack 1	46	9	55	6	0.540	70.370	12.963
Rack 1	47	24	60	6	1.490	71.141	14.094
Rack 1	48	15	5	6	1.040	35.577	11.538
Rack 1	49	24	55	6	1.475	63.729	14.576
Rack 1	50	24	40	6	1.445	75.433	15.225
Rack 1	51	17	45	6	1.200	71.250	16.667
Rack 1	52	13	5	6	0.950	31.053	11.579
Rack 1	53	15	40	6	1.060	75.943	16.509
Rack 1	54	15	0	6	1.170	96.581	22.650
Rack 1	55	23	55	6	1.405	40.569	12.100
Rack 1	56	24	50	6	1.380	46.739	10.507
Rack 1	57	24	25	6	1.840	80.163	16.304
Rack 1	58	24	70	6	1.570	39.490	12.739
Rack 1	59	10	75	6	0.650	40.000	10.769
Rack 1	60	15	40	6	0.960	63.542	15.104
Rack 1	61	24	10	6	1.355	38.007	11.439
Rack 1	62	24	0	6	1.350	124.815	20.370
Rack 1	63	24	30	6	1.575	85.079	22.540
Rack 1	64	24	90	6	1.510	38.742	10.927
Rack 1	65	24	100	6	1.455	30.928	10.309
Rack 1	66	24	30	6	1.520	75.000	19.408
Rack 1	67	24	100	6	1.540	31.818	11.688
Rack 1	68	24	40	6	1.610	59.317	12.422
Rack 1	69	15	85	6	1.325	33.585	11.698
Rack 1	70	24	10	6	1.465	79.522	10.580
Rack 1	71	24	5	6	1.150	57.826	11.304
Rack 1	72	24	25	6	1.300	108.846	11.154
Rack 1	73	24	5	6	1.345	29.368	8.922
Rack 1	101	24	55	4	0.895	35.196	11.173
Rack 1	102	23	65	4	0.815	36.810	9.202
Rack 1	103	24	10	4	0.925	37.297	10.270
Rack 1	104	24	0	4	0.895	121.229	12.849
Rack 1	105	22	10	4	1.020	30.882	9.804
Rack 1	106	24	25	4	1.010	90.594	15.842
Rack 1	107	23	5	4	1.020	36.275	12.353

Table A2. (continued)

Rack 1	108	24	20	4	1.115	45.740	10.762
Rack 1	109	24	25	4	0.980	37.755	13.265
Rack 1	110	24	50	4	0.945	66.667	14.815
Rack 1	111	24	0	4	1.065	33.333	11.737
Rack 1	112	24	65	4	0.835	71.856	11.976
Rack 1	113	24	5	4	0.905	113.812	19.890
Rack 1	114	22	45	4	0.960	42.708	11.979
Rack 1	115	24	25	4	1.080	30.093	10.648
Rack 1	116	24	10	4	0.840	123.214	15.476
Rack 1	117	24	100	4	0.790	31.013	10.127
Rack 1	118	24	0	4	0.885	75.706	13.559
Rack 1	119	23	40	4	0.985	30.457	5.584
Rack 1	120	24	85	4	0.795	32.075	8.805
Rack 1	121	24	90	4	0.900	36.111	11.111
Rack 1	122	15	10	4	0.640	50.781	11.719
Rack 1	123	14	100	4	0.585	29.915	10.256
Rack 1	124	24	20	4	0.930	78.495	15.591
Rack 1	125	15	100	4	0.575	29.565	9.565
Rack 1	126	14	100	4	0.595	31.092	10.924
Rack 1	127	24	5	4	0.840	35.714	11.310
Rack 1	128	24	100	4	0.995	32.161	12.060
Rack 1	129	24	100	4	0.970	31.443	11.856
Rack 1	130	24	25	4	0.940	51.596	14.894
Rack 1	131	24	100	4	0.945	26.984	10.053
Rack 1	132	15	15	4	0.650	57.692	13.846
Rack 1	133	15	100	4	0.520	27.885	9.615
Rack 1	134	24	10	4	0.685	60.584	9.489
Rack 1	135	24	60	4	0.845	32.544	8.876
Rack 1	136	24	100	4	0.935	26.738	10.160
Rack 1	137	24	15	4	0.960	72.917	16.667
Rack 1	138	24	20	4	0.810	35.185	9.877
Rack 1	139	24	40	4	0.780	43.590	10.256
Rack 1	140	24	0	4	0.880	98.864	18.182
Rack 1	141	24	100	4	0.865	31.214	10.983
Rack 1	142	23	0	4	0.945	67.725	12.169
Rack 1	143	24	30	4	0.875	40.571	10.286
Rack 1	144	24	100	4	1.070	31.776	9.813
Rack 1	145	9	100	4	0.330	30.303	9.091
Rack 1	146	15	0	4	0.650	101.538	13.077
Rack 1	147	24	100	4	0.805	30.435	8.696
Rack 1	148	24	0	4	0.925	63.243	11.892
Rack 1	149	24	50	4	1.115	30.942	8.969
Rack 1	150	23	20	4	1.035	72.464	14.010
Rack 1	151	24	20	4	1.175	62.128	12.766
Rack 1	152	24	100	4	0.970	30.412	11.340
Rack 1	153	24	30	4	1.070	31.776	11.682
Rack 1	154	24	100	4	0.965	37.306	11.399
Rack 1	155	24	15	4	0.875	77.714	14.857

Table A2. (continued)

Rack 1	156	22	90	4	0.850	34.706	11.176
Rack 1	157	24	5	4	0.980	120.918	32.653
Rack 1	158	24	25	4	1.145	72.052	18.341
Rack 1	159	24	25	4	0.990	35.859	12.121
Rack 1	160	24	10	4	0.795	28.931	10.692
Rack 1	161	24	40	4	0.805	61.491	12.422
Rack 1	162	24	30	4	0.980	84.694	20.918
Rack 1	163	24	20	4	1.080	79.167	20.370
Rack 1	164	24	35	4	1.050	79.048	18.571
Rack 1	165	24	5	4	0.830	84.337	16.265
Rack 1	166	24	0	4	0.800	32.500	10.625
Rack 1	167	24	100	4	0.865	30.636	11.561
Rack 1	168	24	30	4	1.005	68.657	17.910
Rack 1	169	24	50	4	0.995	34.171	12.563
Rack 1	170	15	45	4	0.635	38.583	14.173
Rack 1	171	15	15	4	0.600	99.167	16.667
Rack 1	172	15	0	4	0.580	77.586	12.069
Rack 1	173	24	10	4	0.915	115.847	19.672
Rack 1	174	24	90	4	0.990	30.808	13.131
Rack 1	175	24	90	4	0.930	46.774	13.978
Rack 1	176	24	90	4	1.030	36.408	10.194
Rack 1	177	24	85	4	0.850	57.647	14.118
Rack 1	178	24	85	4	0.865	56.647	15.029
Rack 1	179	24	0	4	0.985	73.096	17.766
Rack 1	180	24	0	4	0.905	58.011	10.497
Rack 1	181	24	40	4	0.815	30.061	11.043
Rack 1	182	24	5	4	0.820	115.854	18.902
Rack 1	183	24	85	4	0.910	30.769	12.088
Rack 1	184	24	20	4	1.225	42.857	12.653
Rack 1	185	24	50	4	0.925	34.054	12.432
Rack 1	186	23	5	4	1.005	98.010	22.886
Rack 1	187	23	100	4	0.805	29.814	11.180
Rack 1	188	24	100	4	0.930	31.183	11.828
Rack 1	189	24	100	4	0.940	29.255	10.638
Rack 1	190	24	30	4	1.040	70.673	16.827
Rack 1	191	24	20	4	0.890	38.202	11.798
Rack 1	192	24	85	4	0.940	34.043	10.106
Rack 1	193	24	90	4	0.945	33.333	10.582
Rack 1	194	24	0	4	1.115	56.054	16.592
Rack 1	195	24	0	4	0.885	31.073	10.169
Rack 1	196	24	35	4	1.090	30.734	11.468
Rack 1	197	24	20	4	0.940	68.085	12.766
Rack 1	198	24	25	4	0.780	77.564	13.462
Rack 1	199	24	5	4	0.930	52.688	12.366
Rack 1	200	24	50	4	1.115	66.816	11.659
Rack 2	1	24	35	6	1.540	43.831	11.688
Rack 2	2	24	100	6	1.660	29.518	9.940
Rack 2	3	11	0	6	0.650	53.077	10.769

Table A2. (continued)

Rack 2	4	24	100	6	1.575	29.524	10.476
Rack 2	5	12	5	6	0.965	71.503	11.917
Rack 2	6	22	0	6	1.605	103.738	15.888
Rack 2	7	24	15	6	1.325	110.189	16.981
Rack 2	8	23	50	6	1.625	33.846	12.000
Rack 2	9	24	20	6	1.620	50.000	12.037
Rack 2	10	24	0	6	1.420	34.859	9.859
Rack 2	11	13	30	6	1.060	51.415	12.736
Rack 2	12	22	100	6	1.515	29.043	10.561
Rack 2	13	24	45	6	1.495	60.201	17.057
Rack 2	14	24	55	6	1.540	51.299	12.662
Rack 2	15	24	30	6	1.290	70.930	12.403
Rack 2	16	24	100	6	1.515	29.043	10.561
Rack 2	17	22	100	6	1.150	21.739	8.261
Rack 2	18	24	100	6	1.470	28.912	10.544
Rack 2	19	24	100	6	1.410	24.823	9.929
Rack 2	20	23	100	6	1.395	27.240	10.036
Rack 2	21	24	5	6	1.520	96.711	15.789
Rack 2	22	24	100	6	1.725	29.565	10.725
Rack 2	23	24	5	6	1.475	96.271	17.966
Rack 2	24	24	25	6	1.510	47.020	10.596
Rack 2	25	24	0	6	1.535	109.772	31.596
Rack 2	26	14	80	6	0.995	34.171	10.553
Rack 2	27	10	100	6	0.700	34.286	8.571
Rack 2	28	24	45	6	1.545	73.463	14.239
Rack 2	29	24	50	6	1.620	33.333	11.111
Rack 2	30	24	40	6	1.550	94.194	15.484
Rack 2	31	15	10	6	0.950	103.684	13.684
Rack 2	32	10	0	6	0.615	119.512	14.634
Rack 2	33	24	25	6	1.525	91.148	15.082
Rack 2	34	13	20	6	0.925	62.703	11.892
Rack 2	35	9	5	6	0.605	84.298	11.570
Rack 2	36	24	35	6	1.525	94.754	14.426
Rack 2	37	10	25	6	0.760	82.895	13.158
Rack 2	38	10	30	6	0.585	111.111	12.821
Rack 2	39	12	80	6	0.855	29.240	9.357
Rack 2	40	10	100	6	0.650	30.000	7.692
Rack 2	41	24	100	6	1.525	26.557	9.180
Rack 2	42	24	5	6	1.465	127.645	17.747
Rack 2	43	18	25	6	1.050	47.619	9.048
Rack 2	44	24	0	6	1.530	119.608	19.935
Rack 2	45	20	15	6	1.345	69.888	15.613
Rack 2	46	24	0	6	1.630	96.626	25.767
Rack 2	47	24	25	6	1.775	66.197	13.803
Rack 2	48	19	55	6	1.065	45.540	9.390
Rack 2	49	24	0	6	1.420	86.620	13.028
Rack 2	50	24	0	6	1.690	88.462	17.751
Rack 2	51	12	65	6	0.810	53.704	13.580

Table A2. (continued)

Rack 2	52	11	75	6	0.865	43.931	9.827
Rack 2	53	24	40	6	1.540	72.727	14.935
Rack 2	54	24	20	6	1.410	68.794	14.539
Rack 2	55	24	0	6	1.940	74.227	14.948
Rack 2	56	24	45	6	1.650	29.697	9.697
Rack 2	57	24	15	6	1.845	62.331	14.363
Rack 2	58	24	0	6	1.750	103.714	20.571
Rack 2	59	24	95	6	1.490	29.866	10.403
Rack 2	60	12	100	6	0.830	31.928	8.434
Rack 2	61	8	80	6	0.500	39.000	8.000
Rack 2	62	24	70	6	1.355	48.339	11.808
Rack 2	63	13	35	6	0.770	48.052	9.091
Rack 2	64	24	40	6	1.280	85.938	14.453
Rack 2	65	24	40	6	1.185	72.152	11.814
Rack 2	66	24	0	6	1.565	100.319	15.016
Rack 2	67	24	10	6	1.490	99.664	17.450
Rack 2	68	24	5	6	1.625	90.154	15.385
Rack 2	69	24	25	6	1.470	68.707	11.905
Rack 2	70	14	20	6	0.895	37.430	8.939
Rack 2	71	24	5	6	1.350	30.741	8.889
Rack 2	72	20	45	6	1.375	43.636	9.455
Rack 2	73	15	50	6	1.065	69.014	13.146
Rack 2	74	24	30	6	1.600	82.188	11.875
Rack 2	75	9	100	6	0.790	28.481	8.861
Rack 2	100	24	30	4	0.800	30.625	8.750
Rack 2	101	24	20	4	0.895	78.212	12.849
Rack 2	102	24	100	4	0.955	29.843	8.377
Rack 2	103	24	55	4	1.175	26.809	9.362
Rack 2	104	24	100	4	0.940	31.915	9.043
Rack 2	105	24	35	4	1.000	51.000	11.000
Rack 2	106	24	0	4	0.950	83.158	11.053
Rack 2	107	23	0	4	0.995	89.447	13.065
Rack 2	108	24	0	4	1.100	70.000	14.091
Rack 2	109	24	100	4	0.870	29.310	10.920
Rack 2	110	24	30	4	0.925	59.459	13.514
Rack 2	111	24	25	4	1.060	53.302	12.264
Rack 2	112	24	0	4	0.945	27.513	8.995
Rack 2	113	24	50	4	1.030	24.272	9.709
Rack 2	114	24	75	4	1.095	35.616	10.046
Rack 2	115	24	90	4	0.965	25.389	8.808
Rack 2	116	24	100	4	0.750	32.667	9.333
Rack 2	117	24	100	4	1.005	31.343	9.453
Rack 2	118	15	0	4	0.690	120.290	13.768
Rack 2	119	15	50	4	0.605	61.983	13.223
Rack 2	120	24	50	4	1.040	49.519	10.577
Rack 2	121	24	60	4	0.965	62.694	13.990
Rack 2	122	24	80	4	0.955	32.461	9.424
Rack 2	123	24	100	4	0.835	28.743	8.383

Table A2. (continued)

Rack 2	124	23	50	4	0.830	40.361	9.036
Rack 2	125	24	60	4	0.960	29.688	9.375
Rack 2	126	24	45	4	1.030	87.864	14.563
Rack 2	127	15	25	4	0.665	32.331	9.023
Rack 2	128	24	100	4	0.830	29.518	9.036
Rack 2	129	24	100	4	0.985	32.487	9.645
Rack 2	130	24	0	4	1.045	37.799	11.005
Rack 2	131	24	0	4	0.885	81.356	10.169
Rack 2	132	23	100	4	0.865	31.792	8.671
Rack 2	133	15	5	4	0.665	33.083	9.023
Rack 2	134	15	0	4	0.505	98.020	14.851
Rack 2	135	16	10	4	0.590	111.017	20.339
Rack 2	136	24	100	4	0.865	26.012	8.092
Rack 2	137	24	30	4	0.965	88.601	14.508
Rack 2	138	24	20	4	1.030	81.553	14.563
Rack 2	139	24	0	4	0.835	37.725	9.581
Rack 2	140	24	35	4	0.825	79.394	16.364
Rack 2	141	24	0	4	0.880	132.386	13.068
Rack 2	142	24	0	4	0.980	85.714	12.245
Rack 2	143	24	0	4	0.860	89.535	11.628
Rack 2	144	24	10	4	0.840	36.310	8.929
Rack 2	145	24	0	4	1.000	36.500	10.000
Rack 2	146	24	20	4	1.185	37.975	12.236
Rack 2	147	24	25	4	1.000	31.500	10.500
Rack 2	148	24	0	4	1.640	24.390	11.585
Rack 2	149	24	100	4	1.095	27.854	8.676
Rack 2	150	24	25	4	1.105	26.697	8.145
Rack 2	151	10	100	4	0.405	27.160	7.407
Rack 2	152	15	25	4	0.640	41.406	10.156
Rack 2	153	24	90	4	0.800	21.875	5.625
Rack 2	154	23	100	4	0.810	27.160	8.025
Rack 2	155	24	90	4	0.810	30.864	9.259
Rack 2	156	10	65	4	0.425	23.529	5.882
Rack 2	157	13	100	4	0.530	27.358	8.491
Rack 2	158	14	100	4	0.570	23.684	7.018
Rack 2	159	24	95	4	1.050	30.952	9.048
Rack 2	160	24	0	4	0.810	138.889	13.580
Rack 2	161	24	45	4	0.850	51.176	12.941
Rack 2	162	24	0	4	0.935	122.460	14.439
Rack 2	163	24	5	4	1.075	69.767	10.698
Rack 2	164	24	10	4	1.130	38.938	11.062
Rack 2	165	24	100	4	0.860	29.070	9.302
Rack 2	166	24	95	4	0.865	28.324	9.827
Rack 2	167	24	80	4	0.855	33.333	10.526
Rack 2	168	24	100	4	0.955	28.272	9.948
Rack 2	169	24	15	4	1.055	54.028	11.374
Rack 2	170	23	100	4	0.955	31.414	11.518
Rack 2	171	24	80	4	0.940	39.362	10.638

Table A2. (continued)

Rack 2	172	23	25	4	0.990	45.960	11.111
Rack 2	173	24	5	4	1.065	49.296	9.859
Rack 2	174	24	0	4	0.855	145.029	21.637
Rack 2	175	24	0	4	1.015	67.980	12.315
Rack 2	176	24	50	4	1.020	26.471	7.843
Rack 2	177	24	80	4	1.140	33.333	11.842
Rack 2	178	24	40	4	0.915	31.148	10.383
Rack 2	179	24	0	4	0.970	61.856	12.371
Rack 2	180	24	0	4	1.100	34.545	8.182
Rack 2	181	24	0	4	0.915	119.672	16.393
Rack 2	182	24	70	4	1.085	33.180	9.677
Rack 2	183	23	100	4	0.810	25.309	8.642
Rack 2	184	24	0	4	1.115	59.193	8.969
Rack 2	185	24	95	4	0.865	29.480	9.249
Rack 2	186	24	20	4	0.935	62.032	13.904
Rack 2	187	23	80	4	1.025	28.293	10.732
Rack 2	188	24	40	4	0.990	39.899	8.586
Rack 2	189	24	5	4	0.880	97.159	14.773
Rack 2	190	9	95	4	0.350	30.000	8.571
Rack 2	191	9	100	4	0.315	31.746	9.524
Rack 2	192	24	15	4	0.970	79.381	14.948
Rack 2	193	24	0	4	0.900	41.667	10.000
Rack 2	194	24	0	4	0.970	41.237	10.309
Rack 2	195	23	90	4	0.920	35.326	10.326
Rack 2	196	24	15	4	0.920	57.609	9.783
Rack 2	197	24	80	4	0.900	38.889	8.889
Rack 2	198	24	95	4	0.890	29.775	8.427
Rack 2	199	23	55	4	0.865	33.526	8.092
Rack 2	200	24	5	4	0.995	38.693	8.040
Rack 2	201	9	10	4	0.335	70.149	10.448
Box	1	24	35	6	1.800	60.000	18.889
Box	2	24	5	4	0.925	98.919	11.351
Box	3	22	95	6	1.235	26.721	7.692
Box	4	24	5	4	0.985	65.482	15.228
Box	5	24	80	6	1.500	33.667	11.667
Box	6	23	60	6	0.775	48.387	9.032
Box	7	18	100	4	1.010	30.198	10.396
Box	8	24	100	6	0.935	30.481	9.626
Box	9	24	0	4	1.600	90.313	13.750
Box	10	24	35	6	1.075	26.047	8.372
Box	11	24	80	6	1.640	29.878	8.537
Box	12	21	100	4	1.050	29.048	8.571
Box	13	24	0	6	1.565	70.927	13.099
Box	14	9	100	4	0.380	25.000	6.579
Box	15	24	40	6	1.150	68.696	10.435
Box	16	9	65	6	0.430	50.000	10.465
Box	17	24	70	4	1.385	26.354	9.025
Box	18	24	100	6	1.070	28.505	9.813

Table A2. (continued)

Box	19	11	40	4	0.755	27.815	7.947
Box	20	9	85	6	0.365	35.616	8.219
Box	21	15	15	6	1.200	65.833	12.500
Box	22	24	100	4	0.795	25.786	7.547
Box	23	15	45	6	0.925	58.378	11.892
Box	24	15	100	4	0.585	31.624	8.547
Box	25	24	0	6	1.550	110.645	23.871
Box	26	8	100	6	0.335	28.358	7.463
Box	27	17	95	4	1.430	28.322	11.189
Box	28	24	0	6	0.945	68.783	8.995
Box	29	12	90	4	0.825	33.333	7.879
Box	30	9	90	6	0.340	29.412	5.882
Box	31	24	75	6	1.500	41.000	9.333
Box	32	9	65	4	0.315	33.333	6.349
Box	33	19	75	6	1.435	33.449	9.756
Box	34	24	100	4	0.875	24.571	8.000
Box	35	20	75	6	1.690	29.586	10.947
Box	36	24	5	6	1.015	66.502	14.778
Box	37	15	70	4	1.045	58.373	11.005
Box	38	24	100	6	0.905	20.442	7.735
Box	39	24	65	4	1.490	41.611	9.396
Box	40	23	100	6	0.995	29.146	7.035
Box	41	23	75	6	1.470	0.000	9.524
Box	42	24	70	4	1.015	28.079	9.360
Box	43	24	70	6	1.550	33.226	9.677
Box	44	24	20	4	1.140	43.860	10.526
Box	45	24	80	6	1.860	27.688	10.215
Box	46	24	45	6	1.130	45.133	11.504
Box	47	24	90	4	1.600	25.313	8.125
Box	48	24	0	6	1.170	30.769	10.256
Box	49	21	90	4	1.310	28.244	8.397
Box	50	24	0	6	0.965	93.782	11.399
Box	51	10	55	6	0.725	62.069	9.655
Box	52	24	75	4	0.980	44.388	9.184
Box	53	17	30	6	0.960	65.625	9.375
Box	54	24	75	4	0.890	35.393	8.989
Box	55	24	30	6	1.580	71.519	11.709
Box	56	24	5	6	1.025	98.537	12.195
Box	57	24	100	4	1.765	30.312	11.615
Box	58	24	10	6	0.965	33.679	8.290
Box	59	24	0	4	1.320	101.894	10.606
Box	60	24	0	6	0.885	114.124	12.429
Box	63	14	90	6	0.820	33.537	7.317
Box	64	24	65	4	0.875	23.429	6.857
Box	65	24	45	6	1.635	50.459	11.315
Box	66	24	25	4	0.810	20.988	6.173
Box	67	22	100	6	1.500	30.667	7.667
Box	68	24	100	6	1.245	17.269	8.434

Table A2. (continued)

Box	69	24	100	4	1.855	25.606	9.164
Box	70	24	5	6	0.965	85.492	9.845
Box	71	24	10	4	1.405	61.922	10.676
Box	72	23	100	6	0.800	27.500	8.125
Box	73	24	100	6	1.725	29.855	9.275
Box	74	23	100	4	0.925	27.568	8.108
Box	75	24	75	6	1.485	46.801	9.091
Box	76	24	35	4	0.975	35.897	9.231
Box	77	19	70	6	1.405	43.416	10.320
Box	78	24	15	6	0.805	49.068	9.938
Box	79	24	100	4	1.790	32.682	10.335
Box	80	24	50	6	1.120	40.179	9.821
Box	81	22	75	4	1.660	46.386	10.542
Box	82	24	45	6	0.895	85.475	10.056
Box	83	17	85	4	1.430	28.322	9.441
Box	84	23	90	6	0.955	31.414	8.901
Box	85	18	100	6	1.420	27.465	9.859
Box	86	24	0	4	0.960	117.708	14.583
Box	87	14	90	6	0.885	29.944	6.215
Box	88	24	30	4	0.885	88.701	11.864
Box	89	18	0	6	1.120	93.750	12.500
Box	90	24	0	6	0.925	43.243	9.730
Box	91	15	80	4	1.235	27.530	8.502
Box	92	24	5	6	0.750	116.667	10.000
Box	93	24	100	4	1.710	28.070	9.064
Box	94	24	25	6	0.865	56.647	8.092
Box	95	14	50	6	0.955	49.738	10.995
Box	96	24	100	4	0.910	28.022	11.538
Box	97	12	5	6	0.755	29.801	8.609
Box	98	22	10	4	1.020	68.137	8.824
Box	99	24	100	6	1.510	24.172	7.947
Box	100	24	30	4	0.850	27.059	11.765
Box	101	23	100	4	1.065	31.925	9.859
Box	102	12	100	6	0.720	29.861	7.639
Box	103	24	15	4	0.865	121.387	24.855
Box	104	24	75	4	0.860	41.279	8.721
Box	105	17	100	6	0.925	32.432	8.108
Box	106	24	100	4	0.895	29.609	7.821
Box	107	24	100	4	0.865	33.526	7.514
Box	108	7	100	6	0.400	27.500	6.250
Box	109	23	100	4	0.815	33.129	7.362
Box	110	24	100	4	1.065	32.864	9.390
Box	111	12	95	6	0.960	28.125	8.854
Box	112	22	5	4	0.835	114.970	13.772
Box	113	24	5	4	0.985	88.325	12.183
Box	114	13	8	6	0.880	42.614	9.659
Box	115	24	40	4	1.020	54.902	10.784
Box	116	22	60	4	0.835	32.934	8.383

Table A2. (continued)

Box	117	18	80	6	1.185	53.586	8.861
Box	118	24	85	4	1.060	59.434	12.264
Box	119	24	10	4	0.905	30.939	8.287
Box	120	24	30	6	1.680	41.071	12.202
Box	121	24	30	4	0.875	41.714	9.714
Box	122	24	85	4	0.855	22.807	7.018
Box	123	13	100	6	0.795	28.931	8.176
Box	124	24	20	4	0.920	27.717	7.065
Box	125	24	80	4	0.995	28.643	8.543
Box	126	24	70	6	1.450	43.103	8.276
Box	127	24	20	4	0.950	64.211	9.474
Box	128	24	100	4	0.825	30.909	7.879
Box	129	18	100	6	1.165	30.043	9.442
Box	130	24	0	4	0.980	112.755	11.224
Box	131	23	10	4	0.915	106.557	14.754
Box	132	19	100	6	1.245	29.317	9.237
Box	133	24	40	4	0.920	42.391	8.696
Box	134	22	0	4	0.855	117.544	12.865
Box	135	12	80	6	0.765	35.294	7.190
Box	136	23	10	4	0.785	53.503	7.643
Box	137	24	10	4	0.950	97.368	16.842
Box	138	24	100	6	1.460	29.452	9.247
Box	139	21	80	4	0.900	36.111	8.889
Box	140	24	80	4	1.035	40.097	11.111
Box	141	24	90	6	1.400	27.500	9.286
Box	142	24	100	4	0.880	28.409	7.955
Box	143	14	100	4	0.595	31.092	8.403
Box	144	24	100	6	1.420	25.352	8.099
Box	145	15	90	4	0.645	32.558	7.752
Box	146	15	20	4	0.620	62.097	8.871
Box	147	24	50	6	1.805	25.762	10.249
Box	148	24	0	4	0.970	69.588	8.763
Box	149	22	50	4	0.905	50.276	10.497
Box	150	24	100	6	1.300	30.769	8.077
Box	151	24	50	4	1.020	28.922	8.824
Box	152	24	10	4	0.990	93.434	15.152
Box	153	24	100	6	1.355	31.365	8.118
Box	154	24	45	4	0.765	65.359	9.804
Box	155	24	100	4	0.825	37.576	9.091
Box	156	14	100	6	0.890	29.775	8.427
Box	157	24	0	4	0.890	115.730	13.483
Box	158	24	25	4	1.015	27.094	8.867
Box	159	16	85	6	1.100	39.545	10.000
Box	160	24	50	4	0.950	32.105	7.895
Box	161	23	80	4	0.860	51.744	10.465
Box	162	17	85	6	0.940	31.915	8.511
Box	163	24	0	4	1.005	41.791	7.960
Box	164	23	80	4	0.920	44.565	8.152

Table A2. (continued)

Box	165	9	90	6	0.510	24.510	6.863
Box	166	23	45	4	0.965	61.658	12.953
Box	167	24	0	4	0.985	89.848	14.721
Box	168	11	95	6	0.950	26.842	10.526
Box	169	22	40	4	0.920	24.457	7.065
Box	170	24	5	4	0.885	90.960	9.605
Box	171	13	85	6	0.850	27.647	8.235
Box	172	14	100	4	0.565	21.239	7.080
Box	173	14	20	4	0.565	51.327	8.850
Box	174	7	100	6	0.480	26.042	6.250
Box	175	14	95	4	0.575	23.478	6.957
Box	176	24	10	4	0.825	57.576	8.485
Box	177	9	90	6	0.560	25.893	6.250
Box	178	22	50	4	0.735	48.980	8.163
Box	179	24	90	4	0.875	29.143	8.571
Box	180	12	75	6	1.040	24.038	9.135
Box	181	24	45	4	1.000	78.000	10.000
Box	182	24	0	4	1.005	101.990	13.433
Box	183	8	100	6	0.530	28.302	6.604
Box	184	24	5	4	0.790	53.797	7.595
Box	185	24	75	4	0.910	29.670	7.692
Box	186	11	65	6	0.855	29.825	9.357
Box	187	24	0	4	1.065	54.930	10.329
Box	188	23	30	4	1.050	66.667	10.952
Box	189	15	75	6	0.990	25.758	8.586
Box	190	24	100	4	0.870	31.034	8.046
Box	191	24	35	4	0.925	60.000	8.108
Box	192	9	100	6	0.585	20.513	5.983
Box	193	24	10	4	0.990	81.818	13.131
Box	194	24	0	4	0.900	96.111	13.889
Box	195	9	100	6	0.585	23.932	6.838
Box	196	24	0	4	0.890	96.067	13.483
Box	197	24	5	4	0.855	26.901	7.602
Box	198	12	100	6	0.720	23.611	7.639
Box	199	22	100	4	0.935	28.877	8.556
Box	200	22	40	4	0.945	56.614	7.937
Box	201	9	90	6	0.745	22.148	7.383
Box	202	24	15	4	0.765	96.732	10.458
Box	203	24	100	4	0.875	34.286	8.571
Box	204	8	70	6	0.580	28.448	6.897
Box	205	24	5	4	0.940	102.128	14.362
Box	206	24	0	4	0.805	110.559	8.696
Box	207	12	100	6	0.875	25.143	8.571
Box	208	23	0	4	0.805	35.404	7.453
Box	209	24	25	4	0.915	30.601	8.197
Box	210	7	90	6	0.420	23.810	5.952
Box	211	24	55	4	0.920	77.174	10.326
Box	212	22	100	4	0.985	35.025	9.137

Table A2. (continued)

Box	213	7	85	6	0.345	23.188	5.797
Box	214	24	0	4	0.845	96.450	9.467
Box	215	9	25	4	0.345	86.957	7.246
Box	216	10	100	6	0.690	23.913	6.522
Box	217	9	40	4	0.365	46.575	8.219
Box	218	15	95	4	0.575	33.913	7.826
Box	219	8	100	6	0.565	22.124	6.195
Box	220	15	20	4	0.580	82.759	9.483
Box	221	23	100	4	0.890	28.652	9.551
Box	222	9	85	6	0.780	24.359	8.974
Box	223	15	60	4	0.665	43.609	9.023
Box	224	24	45	4	0.970	34.536	8.763
Box	225	9	0	6	0.620	25.000	7.258
Box	226	23	30	4	0.925	37.297	9.189
Box	227	24	0	4	0.930	29.570	6.989
Box	228	9	80	6	0.535	31.776	6.542
Box	229	24	0	4	1.115	56.054	13.004
Box	230	24	0	4	0.985	74.619	11.168
Box	231	9	100	6	0.620	27.419	8.871
Box	232	24	0	4	1.050	93.333	13.810
Box	233	24	90	4	1.105	25.339	9.502
Box	234	8	90	6	0.470	24.468	7.447
Box	235	24	25	4	0.890	74.719	10.674
Box	236	8	10	4	0.420	20.238	5.952
Box	237	6	100	6	0.380	39.474	6.579
Box	238	9	10	4	1.020	Error	7.353
Box	239	24	100	4	0.375	Error	5.333
Box	240	6	100	6	0.995	Error	8.040
Box	241	24	100	4	1.095	Error	9.589
Box	242	24	100	4	0.500	Error	7.000
Box	243	8	25	6	0.785	Error	8.280
Box	244	24	95	4	1.055	Error	8.531
Box	245	24	0	4	0.480	Error	6.250
Box	246	9	30	6	0.855	Error	7.018
Box	247	24	100	4	1.015	Error	11.823
Box	248	24	0	4	0.445	Error	5.618
Box	249	9	100	6	1.205	Error	8.714
Box	250	24	0	4	1.065	Error	8.451
Box	251	24	5	4	0.555	Error	6.306
Box	252	9	100	6	0.790	Error	7.595
Box	253	24	0	4	0.925	Error	8.649
Box	254	24	45	4	0.655	Error	5.344
Box	255	10	100	6	1.045	Error	7.656
Box	256	23	50	4	1.035	Error	9.179
Box	257	24	100	4	0.530	Error	6.604
Box	258	8	95	6	0.970	Error	8.247
Box	259	24	0	4	1.065	Error	8.451
Box	260	24	15	4	0.615	Error	6.504

Table A2. (continued)

Box	261	10	85	6	1.110	Error	9.459
Box	262	24	55	4	1.135	Error	9.692
Box	263	24	100	4	0.555	Error	7.207
Box	264	8	100	6	1.145	Error	9.170
Box	265	24	0	4	1.150	Error	9.565
Box	266	24	100	4	0.490	Error	6.122
Box	267	8	100	6	1.010	Error	10.396
Box	268	24	0	4	0.925	Error	9.189
Box	269	24	35	4	0.620	Error	7.258
Box	270	10	100	6	0.990	Error	9.091
Box	271	24	10	4	1.010	Error	11.386
Box	272	24	0	4	0.485	Error	6.186
Box	273	8	10	6	0.970	Error	7.216
Box	274	24	100	4	0.785	Error	7.643
Box	275	23	10	4	0.410	Error	6.098
Box	276	7	5	6	1.040	Error	7.692
Box	277	24	8	4	0.985	Error	8.122
Box	278	24	100	4	0.605	Error	6.612
Box	279	8	100	6	1.230	Error	9.756
Box	280	24	100	4	1.030	Error	7.282
Box	281	24	100	4	0.750	Error	7.333
Box	282	11	30	6	1.225	Error	8.980
Box	283	24	15	4	0.905	Error	8.840
Box	284	24	50	4	0.505	Error	5.941
Box	285	8	95	6	0.380	Error	6.579

APPENDIX B

Statistical Output

Table B1. General linear model and Tukey's Studentized Range Test output for Geometric Drying Properties phase charge one (1) mean final moisture contents by length, width and space. Means exhibiting no significant differences are excluded from Tukey output.

General Linear Models Procedure
Class Level Information

Class	Levels	Values
WIDTH	3	4, 6, 8
LENGTH	7	0.5, 1.0, 1.5, 2.0, 2.5, 3.5, 8.0
SPACE	2	0 (No), 1 (Yes)
Number of observations in data set = 219		

Dependent Variable: ENDMC

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	38	1709.6703	44.9913	2.60	0.0001
Error	180	3111.0221	17.2835		
Corrected Total	218	4820.6925			
	R-Square	C.V	Root MSE		ENDMC Mean
	0.354652	41.80316	4.1573		9.9450

Source	DF	Type III SS	Mean Square	F Value	Pr > F
WIDTH	2	587.93679	293.96839	17.01	0.0001
LENGTH	6	276.42834	46.07139	2.67	0.0168
WIDTH*LENGTH	12	134.28710	11.19059	0.65	0.7993
SPACE	1	81.62282	81.62282	4.72	0.0311
WIDTH*SPACE	2	25.01272	12.50636	0.72	0.4864
LENGTH*SPACE	5	55.86145	11.17229	0.65	0.6646
WIDTH*LENGTH*SPACE	10	144.26238	14.42624	0.83	0.5958

Table B1. (continued)

Tukey's Studentized Range (HSD) Test for variable: ENDMC
NOTE: This test controls the type I experimentwise error rate.
Alpha= 0.05 Confidence= 0.95 df= 180 MSE= 17.28346
Critical Value of Studentized Range= 3.342

Comparisons significant at the 0.05 level are indicated by '*'.**

WIDTH Comparison	Simultaneous Lower Confidence Limit	Difference Between Means	Simultaneous Upper Confidence Limit	
6 - 4	2.1238	3.5737	5.0237	***
6 - 8	1.8485	4.0497	6.2510	***

LENGTH Comparison	Simultaneous Lower Confidence Limit	Difference Between Means	Simultaneous Upper Confidence Limit	
0.5 - 1.0	-6.6046	-3.5260	-0.4474	***
0.5 - 1.5	-6.4858	-3.4072	-0.3285	***
0.5 - 2.0	-6.8459	-3.6971	-0.5482	***
0.5 - 2.5	-7.0239	-3.9663	-0.9087	***
0.5 - 3.5	-8.2056	-5.0814	-1.9573	***
0.5 - 8.0	-8.3142	-4.8583	-1.4023	***

Means with the same letter are not significantly different.

Tukey Grouping	Mean	N	SPACE
A	10.8161	124	0 (No)
B	8.8081	95	1 (Yes)

Table B2. General linear model and Tukey's Studentized Range Test output for Geometric Drying Properties phase charge two (2) mean final moisture contents by length, width and space. Means exhibiting no significant differences are excluded from Tukey output.

General Linear Models Procedure
Class Level Information

Class	Levels	Values
WIDTH	3	4, 6, 8
LENGTH	7	0.5, 1.0, 1.5, 2.0, 2.5, 3.5, 8.0
SPACE	2	0 (No), 1 (Yes)
Number of observations in data set = 227		

Dependent Variable: ENDMC

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	38	355.32271	9.35060	2.86	0.0001
Error	188	614.25603	3.26732		
Corrected Total	226	969.57874			
	R-Square	C.V.	Root MSE		ENDMC Mean
	0.366471	21.45036	1.8076		8.4268

Source	DF	Type III SS	Mean Square	F Value	Pr > F
WIDTH	2	91.07249	45.53624	13.94	0.0001
LENGTH	6	100.86260	16.81043	5.15	0.0001
WIDTH*LENGTH	12	41.24745	3.43729	1.05	0.4034
SPACE	1	1.94467	1.94467	0.60	0.4414
WIDTH*SPACE	2	4.42477	2.21238	0.68	0.5093
LENGTH*SPACE	5	18.18092	3.63618	1.11	0.3550
WIDTH*LENGTH*SPACE	10	15.18293	1.51829	0.46	0.9111

Tukey's Studentized Range (HSD) Test for variable: ENDMC
NOTE: This test controls the type I experimentwise error rate.
Alpha= 0.05 Confidence= 0.95 df= 188 MSE= 3.267319
Critical Value of Studentized Range= 3.341

Comparisons significant at the 0.05 level are indicated by '*'.**

WIDTH Comparison	Simultaneous Lower Confidence Limit	Difference Between Means	Simultaneous Upper Confidence Limit	
6 - 8	0.2703	1.1959	2.1215	***
6 - 4	0.6301	1.2486	1.8670	***

Table B2. (continued)

Tukey's Studentized Range (HSD) Test for variable: ENDMC
NOTE: This test controls the type I experimentwise error rate.
Alpha= 0.05 Confidence= 0.95 df= 188 MSE= 3.267319
Critical Value of Studentized Range= 4.215

Comparisons significant at the 0.05 level are indicated by '*'.**

WIDTH Comparison	Simultaneous Lower Confidence Limit	Difference Between Means	Simultaneous Upper Confidence Limit	
8 - 0.5	2.1745	3.6206	5.0668	***
8 - 1.0	0.8359	2.2905	3.7450	***
8 - 1.5	0.6427	2.0809	3.5190	***
8 - 2.0	0.2878	1.7605	3.2333	***
8 - 2.5	0.3716	1.8178	3.2639	***
8 - 3.5	0.4057	1.8784	3.3512	***
0.5 - 1.0	-2.6275	-1.3302	-0.0329	***
0.5 - 1.5	2.8187	-1.5398	-0.2609	***
0.5 - 2.0	-3.1778	-1.8601	-0.5424	***
0.5 - 2.5	-3.0907	-1.8029	-0.5150	***
0.5 - 3.5	-3.0599	-1.7422	-0.4245	***
0.5 - 8.0	-5.0668	-3.6206	-2.1745	***

Table B3. General linear model and Tukey's Studentized Range Test output for Geometric Drying Properties phase charge three (3) mean final moisture contents by length, width and space. Means exhibiting no significant differences are excluded from Tukey output.

General Linear Models Procedure
Class Level Information

Class	Levels	Values
WIDTH	3	4, 6, 8
LENGTH	7	0.5, 1.0, 1.5, 2.0, 2.5, 3.5, 8.0
SPACE	2	0 (No), 1 (Yes)
Number of observations in data set = 253		

Table B3. (continued)

Dependent Variable: ENDMC

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	38	282.80726	7.44230	5.71	0.0001
Error	214	278.92258	1.30338		
Corrected Total	252	561.72984			
.	R-Square	C.V.	Root MSE		ENDMC Mean
	0.503458	14.86295	1.1417		7.6812

Source	DF	Type III SS	Mean Square	F Value	Pr > F
WIDTH	2	4.99310	2.49655	1.92	0.1498
LENGTH	6	161.11732	26.85289	20.60	0.0001
WIDTH*LENGTH	12	54.24946	4.52079	3.47	0.0001
SPACE	1	21.37159	21.37159	16.40	0.0001
WIDTH*SPACE	2	20.71027	10.35514	7.94	0.0005
LENGTH*SPACE	5	1.28107	0.25621	0.20	0.9636
WIDTH*LENGTH*SPACE	10	10.61475	1.06147	0.81	0.6151

Tukey's Studentized Range (HSD) Test for variable: ENDMC
NOTE: This test controls the type I experimentwise error rate.
Alpha= 0.05 Confidence= 0.95 df= 214 MSE= 1.303377
Critical Value of Studentized Range= 3.338

Comparisons significant at the 0.05 level are indicated by '*'.**

WIDTH Comparison	Simultaneous Lower Confidence Limit	Difference Between Means	Simultaneous Upper Confidence Limit	
4 - 8	0.0676	0.4961	0.9246	***

Table B3. (continued)

LENGTH Comparison	Simultaneous Lower Confidence Limit	Difference Between Means	Simultaneous Upper Confidence Limit	
8 - 0.5	2.0901	2.9503	3.8104	***
8 - 1.0	0.8838	1.7345	2.5853	***
8 - 1.5	0.4860	1.3462	2.2063	***
8 - 2.0	0.1991	1.0592	1.9193	***
8 - 2.5	0.0594	0.9148	1.7701	***
8 - 3.5	0.1273	0.9826	1.8380	***
2.5 - 1.0	0.0451	0.8197	1.5943	***
0.5 - 1.0	-1.9956	-1.2157	-0.4359	***
0.5 - 1.5	-2.3942	-1.6041	-0.8140	***
0.5 - 2.0	-2.6812	-1.8911	-1.1010	***
0.5 - 2.5	-2.8204	-2.0355	-1.2506	***
0.5 - 3.5	-2.7525	-1.9676	-1.1828	***
0.5 - 8.0	-3.8104	-2.9503	-2.0901	***

Means with the same letter are not significantly different.

Tukey Grouping	Mean	N	SPACE
A	8.1413	139	0 (No)
B	7.1203	114	1 (Yes)

Table B4. General linear model and Tukey's Studentized Range Test output for Geometric Drying Properties phase charge four (4) mean final moisture contents by length, width and space. Means exhibiting no significant differences are excluded from Tukey output.

General Linear Models Procedure
for Charge Four (4)

Class	Levels	Values
WIDTH	3	4, 6, 8
LENGTH	7	0.5, 1.0, 1.5, 2.0, 2.5, 3.5, 8.0
SPACE	2	0 (No), 1 (Yes)
Number of observations in data set = 251		

Table B4. (continued)

Dependent Variable: ENDMC

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	38	329.33172	8.66662	5.27	0.0001
Error	212	348.89511	1.64573		
Corrected Total	250	678.22682			
.	R-Square	C.V.	Root MSE		ENDMC Mean
	0.485578	17.94675	1.2829		7.1482

Source	DF	Type III SS	Mean Square	F Value	Pr > F
WIDTH	2	138.33221	69.16611	42.03	0.0001
LENGTH	6	97.07546	16.17924	9.83	0.0001
WIDTH*LENGTH	12	27.67112	2.30593	1.40	0.1670
SPACE	1	1.79922	1.79922	1.09	0.2969
WIDTH*SPACE	2	8.26441	4.13221	2.51	0.0836
LENGTH*SPACE	5	20.52345	4.10469	2.49	0.0321
WIDTH*LENGTH*SPACE	10	6.85348	0.68535	0.42	0.9378

Tukey's Studentized Range (HSD) Test for variable: ENDMC
NOTE: This test controls the type I experimentwise error rate.
Alpha= 0.05 Confidence= 0.95 df= 212 MSE= 1.645732
Critical Value of Studentized Range= 3.338

Comparisons significant at the 0.05 level are indicated by '*'.**

WIDTH Comparison	Simultaneous Lower Confidence Limit	Difference Between Means	Simultaneous Upper Confidence Limit	
4 - 6	0.2639	0.7090	1.1541	***
4 - 8	1.4121	1.8990	2.3860	***
6 - 4	-1.1541	-0.7090	-0.2639	***
6 - 8	0.6636	1.1900	1.7165	***

LENGTH Comparison	Simultaneous Lower Confidence Limit	Difference Between Means	Simultaneous Upper Confidence Limit	
0.5 - 1.0	-2.0955	-1.1950	-0.2946	***
0.5 - 1.5	-2.5794	-1.6847	-0.7900	***
0.5 - 2.0	-2.6999	-1.7995	-0.8990	***
0.5 - 2.5	-2.7187	-1.8295	-0.9403	***
0.5 - 3.5	-2.9712	-2.0765	-1.1818	***
0.5 - 8.0	-3.0209	-2.0428	-1.0646	***

Table B5. General linear models and Tukey's Studentized Range Test output for normalized final moisture contents by length, width and space for all charges. Means exhibiting no significant differences are excluded from Tukey output.

General Linear Models Procedure
Class Level Information

Class	Levels	Values
WIDTH	3	4 6 8
LENGTH	6	0.5, 1.0, 1.5, 2.0, 2.5, 3.5
SPACE	2	0 (No), 1 (Yes)
Number of observations in data set = 851		

Dependent Variable: NORMAL

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	35	97368.161	2781.947	11.47	0.0001
Error	815	197722.88	242.605		
Corrected Total	850	295091.04			
	R-Square	C.V	Root MSE		NORMAL Mean
	0.329960	15.63588	15.576		99.616

Source	DF	Type III SS	Mean Square	F Value	Pr > F
WIDTH	2	328.705	164.353	0.68	0.5082
LENGTH	5	74732.349	14946.470	61.61	0.0001
WIDTH*LENGTH	10	1451.327	145.133	0.60	0.8161
SPACE	1	38.475	38.475	0.16	0.6906
WIDTH*SPACE	2	1.511	0.755	0.00	0.9969
LENGTH*SPACE	5	5926.662	1185.332	4.89	0.0002
WIDTH*LENGTH*SPACE	10	2236.609	223.661	0.92	0.5121

Table B5. (continued)

Tukey's Studentized Range (HSD) Test for variable: NORMAL
NOTE: This test controls the type I experimentwise error rate.
Alpha= 0.05 Confidence= 0.95 df= 815 MSE= 242.6048
Critical Value of Studentized Range= 3.321

Comparisons significant at the 0.05 level are indicated by '*'.**

LENGTH Comparison	Simultaneous Lower Confidence Limit	Difference Between Means	Simultaneous Upper Confidence Limit	
0.5 - 1.0	-24.456	-19.156	-13.856	***
0.5 - 1.5	-30.138	-24.846	-19.555	***
0.5 - 2.0	-32.629	-27.263	-21.897	***
0.5 - 2.5	-32.638	-27.364	-22.091	***
0.5 - 3.5	-35.643	-30.306	-24.968	***
1.0 - 0.5	13.856	19.156	24.456	***
1.0 - 1.5	-10.925	-5.690	-0.456	***
1.0 - 2.0	-13.417	-8.107	-2.797	***
1.0 - 2.5	-13.425	-8.208	-2.991	***
1.0 - 3.5	-16.430	-11.149	-5.868	***
1.5 - 3.5	-10.731	-5.459	-0.187	***

LENGTH	NORMAL LSMEAN
0.5	77.897100
1.0	96.821259
1.5	102.924242
2.0	105.124646
2.5	104.759571
3.5	108.311280