AN INTERVIEW WITH

WILLIAM B. STUART & LAURA GRACE

by

Peter MacDonald & Michael Clow

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Forest History Society, Inc.
Durham, North Carolina

701 William Vickers Ave.
Durham, NC 27713
www.foresthistory.org

Explanatory Notes to Accompany the
Interview of William Stuart and Laura Grace
by
Peter MacDonald

This is a massive interview, both in terms of its sheer length and in the multiplicity of topics discussed. Indeed, we spent a day and one-half with Bill Stuart and his research colleague, Laura Grace. Following an afternoon of becoming acquainted, we spent an entire day at Bill's home during which time this interview was recorded. It is an interview which will well repay the time and effort the reader will have to devote in order to assimilate it.

Precisely because of its diversity, it is tantamount to impossible to identify one or even a few themes on which to comment. Accordingly, I think it best to remark on the perspective Stuart brings to the subject of mechanization in the woods, together with his insight into the social and economic forces which enveloped this process. Though Stuart is a forest engineer, as evidenced by his development of the Harvesting Analysis Technique[1] while employed by the Harvesting Research Project and by his role in the creation of the Industrial Forest Operations Program while at Virginia Tech, perhaps rendering him unique among his professional colleagues is his posing of the sorts of questions more familiar to a sociologist or historian. In his own words, "... forestry is a social construct, not a science and engineering construct. And it's so integrated into the society here ...". And again: "... since I've been at Mississippi State the interest has shifted more towards the wood supply system rather than just harvesting technology, using this synonym to embrace not just the technical portion but also the social and marketing dimensions of wood supply between the landowner and the mill". His intellectual interests clearly transcend those of the profession of which he is a member.

Moreover, his perspective provides him with a standpoint from which to gently tweak some of the analytical practices engaged in by some of his fellow forest engineers. I particularly enjoyed this comment with reference to the traditional industrial engineering analysis undertaken by conventional forest engineering: "They understood how to absorb machinery and they understood how to take the regression analysis of skidder productivity and when you got an R squared that was only fifty-five percent then you laid off forty-five percent through aggressiveness and kept on trucking without worrying about where it came from."[2] A final instance: early in the interview he takes a gentle poke at "Tayloristic engineers". Reference here is to Frederick Taylor, founder of the

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[1] HAT is the computerized simulation programme used to evaluate different harvesting machines and systems.

[2] R is the symbol for a correlation coefficient calculated by regression analysis. R squared is the amount of variation accounted for by the correlation. Thus when analyzing the variables that accounted for differences in skidder productivity, the traditional variables used by forest engineers – length of the skid, quantity of fibre being skidded, etc. – explained only fifty-five per cent of the total variation. They coped with the remaining forty-five per cent by naming it crew aggressiveness, essentially rendering it a miscellaneous category without explaining it at all.

school of scientific management, a school obsessed with detailed time and motion studies of workers and the work process at the expense of their social relations and networks.

Stuart's discussion of the general state of health historically in Mississippi is fascinating. Poor diet, prevalence of disease – all took their toll on the quantity of energy workers brought to their tasks in an unforgiving climate marked by heat and humidity. Moreover, he explicitly ties this to the mechanization process in that he conceives of this state of health as one of the social forces shaping it. Here he talks of the development of simple machines requiring not a great deal of skill to operate whose primary function was not to replace labour, but to augment or multiply it by maximizing the physical effort these workers could offer. One consequence was that mechanization was "... a much more humble approach ..." than elsewhere. Now there were other forces at work, as the interview details. But a recognition of this one underlines the point I made above.

One of those other factors identified by Stuart motivating this "humble approach" was the local (as opposed to national or international) quality of many of the early mechanical innovations. Relating "... just one of Bill Stuart's half ass theories ...", he argues the significance of the mechanical skills and the need to make do with what is at hand learned by World War II veterans was translated into simple, rugged machines that could be manufactured and serviced locally.

In his explanation of the bobtail truck harvesting system, he goes far beyond a simple technical description of the system. He is at pains to point out that the system constituted a work team in which no one person had a specific job. Instead, the technology of the production system was made to accommodate itself to the workers. For instance, there was job rotation together with efforts to cater to the requirements of older or less fit workers. He discusses how some common endeavours (such as loading, travelling to the wood yard, and unloading) brought the workers together providing a time where workers talked to and kidded one another as they collectively accomplished the task. He notes that ownership of the truck constituted a status symbol. By extension, an investigator thus informed would be attuned to the restructuring of this social dimension that various forms of mechanization might unwittingly bring about. These are precisely the sorts of factors that might, if not undermine, at least retard mechanization – much to the puzzlement of those attempting to foment this innovation. Certainly the Battelle recommendation about specialized self-loading trucks ignored these sorts of factors. (At least until Tom Walbridge pointed out some of these.)

Most interesting to me is Stuart's intricate and complicated account of the historical crucible in which the relationships among agriculture, the wood dealer system, and the bobtail truck type of pulpwood harvesting were forged. To understand the foundation from which the process of harvesting mechanization progressed, one must begin with as thoroughgoing appreciation as possible of the specific interrelation of these constitutive forces. Here Stuart makes much of the different kinds of crops in different geological areas, the seasonal articulation of farming with logging, and the effects of crop specialization and agricultural mechanization on this

relationship. He highlights the formative role played by the social arrangements of sharecropping and the factor system. Because this is so complex, I can only plea that this be read with care. For now realize that the comprehension of what on its surface appears relatively straightforward – a particular way of producing pulpwood – must move far afield, into the political economy that provides its context. Stuart's perspective, precisely because it transcends the conventional forest engineering approach, is all the more valuable because of these analytical demands. To this end, I offer yet one more quote from Stuart: "A good friend of mine from Canada ... said in Canada we use our stumpage to support our people. In the South you abuse your people to support your stumpage prices. And there's a great deal of truth in that and that's one of the things that shaped our attitudes here."

Though the Battelle Memorial Institute and the Harvesting Research Project have been discussed in the notes to other interview (notably the ones with Walbridge and Lanford), this interview contains the most comprehensive accounts of these important mechanization initiatives undertaken by the American Pulpwood Association. Stuart discusses the concerns held by the APA over both wood shortages in the 1950s and the supply of labour which led to the employment of the Battelle people. Their reports are important for they provide an insight into the nature of Southeastern pulpwood harvesting in the early 1960s. He discusses their primary recommendations of mechanizing the loading process and segmenting trucking from the actual harvesting process. And of course he was well placed to talk about the HRP. As well as talking about the various kinds of research activities undertaken, he provides the most complete account that I have seen of the different factors likely responsible for its demise.

Throughout this note, my unifying theme has been what some might want to claim as Stuart's rather eccentric breadth of interest, at least from the perspective of conventional forest engineering. To conclude, it is fitting to recount a final "Bill Stuart story". It seems to me that one quality associated with this comprehensive and open-minded perspective is a sense of humour, the capacity to gently criticize one's profession and ultimately one's self. So I end with this: "And Jim gets up and gives his discussion about the Currie [Cost Cutter] and he said I predict that this slasher will not be successful in the South. He said it has three inherent disadvantages. We all know that anything to be successful has to be expensive. It has to be loud. And it has to be troublesome. He said the difficulty with the Currie is it's cheap, it's quiet, and it works. He said, therefore, it will never be successful."

Peter MacDonald (PM): All right, today is June the 5th. We're interviewing Bill Stewart and Laura Grace, both professors of forestry at Mississippi State University and the two people doing the interviewing are Peter McDonald and Michael Clow. The Forest History Society, Bill, likes us to begin with kind of a brief biography. And if it is not too intrusive about where you were born and when and all that kind of stuff and how you got into, well, I was going to say the industry but I'm not sure if that's entirely accurate in your case because it was more on the academic side mostly as I understand it, but anyway.

Bill Stewart (BS): Okay, a brief rundown. I'm a native of Jefferson County, Pennsylvania, near Dubois. Grew up in a farming family that had several generations' history of farming and logging, alternating seasonally. And grew up with stories of the logging industry in Pennsylvania in the 1900s to 1930s period. I graduated Brockway High School, bachelors at Penn State. When I got out of Penn State you could do anything back home except make a living so I went to Duke, got a master of forestry there in 1964 and the following night was hired on as an extension specialist in harvesting at North Carolina State and worked for about three years at N.C. State. The major part of the effort there was introducing skidders and knuckle boom loaders into the logging community, as well as working with pulpwood production. Nineteen sixty-seven I went to work for the American Pulpwood Association Harvesting Research Project in Atlanta and spent the next seven years working on harvesting development, various efforts at mechanization and job improvement. At the demise of the Harvesting Research Project in 1974 I took a position as research associate at Virginia Polytechnic Institute and State University with Dr. Tom Walbridge and he and I put together what became the Industrial Forestry Operations Program. This was a research and teaching program dealing with the harvesting technology and harvesting and transportation. I during that period worked on a variety of projects dealing with harvesting technology, harvesting operations, and forest products logistics. After twenty-five years there, I took an interregnum and went to New Zealand as a senior research fellow at the Forest Research Institute in Rotorua in 1984 and spent a year, '84, '85 in New Zealand.

By 1999 I had served my twenty-five years at Virginia Tech. It was time for a change and retired from Virginia Tech and joined the faculty at Mississippi State. And since I've been at Mississippi State the interest has shifted more towards the wood supply system rather than just harvesting technology, using this synonym to embrace not just the technical portion but also the social and marketing dimensions of wood supply between the landowner and the mill. And spent the last five years here in teaching and research and also doing a fair amount of work with the logger education program, particularly the business management component for small logging businesses. Was that too elaborate?

Michael Clow (MC): No. Laura, what's your story?

Laura Grace (LG): What's my story. I'm actually an Army brat. My dad was stationed in Okinawa when I was born. Spent most of the next eighteen years of my life traveling around quite a bit living in different countries, different states. Ended up in high school in Fairfax County in Northern Virginia. Decided I wanted to go to Virginia Tech for college. Flipped the application over, picked a major. I didn't know what forestry meant so I picked it. I'm being very honest here. It's not part of my family background. Got into it, went to work for the Forest Service after my freshman year co-op Discovered I liked the people side of it and the one group, the one area at Virginia Tech that really focused on people was this Industrial Forestry Operations Program. So I worked my way into that program. Ended up in graduate school doing a masters project on residue utilization. I talked back to my major professor one time, who was Bill, and he traded me to Sweden for four years, which is where I did my Ph.D. work, actually in forest products. Finished that up in '94. Moved down here accepting a teaching research position. Got volunteered to do extension work, which is our formal outreach adult education program, and have been basically wearing three different hats for the last eight years, on campus teaching, the off campus teaching, as well as the research, focusing in this wood supply systems area trying to work with the businesses, small family businesses, finding ways to improve their position. I guess that's in a nutshell very quickly sort of how I got into this by accident but I've stayed in it by intention.

PM: One of the things I'd like to explore a little bit, Bill, is the Industrial Forest Operations Program at Virginia Tech. Now that was being set up when you and Tom Walbridge were there?

BS: One of the things after HRP, we spent a great deal of time working on innovation and unfortunately the research results were slow to get into application because there was nobody in the industry to pick it up, in that between the research and the technology transfer. Most of the foresters that were active in the South had been trained primarily as land managers. And what we were dealing with was an engineering sociological milieu that they were not well prepared to work in, in small private business, I guess, engineering, social, and entrepreneurial skill business. So there was a decision made on the part of the sponsors of HRP to terminate the project, that they recognized this need. And so part of the negotiations between the American Pulpwood Association, Virginia Tech, and Tom and I led to the creation of this IFO program. And so that's where we put a program together and it was an interesting one. It was a mix of, it was the only forestry program that required sociology, required labor relations. We taught courses in business. We had people taking accounting. And it created a little bit of friction between traditional forestry tree oriented forestry and the wood supply orientation. At that time what we were, our target group was to produce procurement foresters, foresters who could go out and buy timber, work with loggers to coordinate the flow to the mill, understand the mechanics and the business aspects of it.

LG: And there was a fair amount of engineering in the program as well that was a little bit different from most of the traditional forestry programs with a biological orientation.

BS: We spent time with train vehicle systems, the equipment to be used in harvesting. Spent time in hydraulics, static strength of materials and Virginia Tech was a good place to do it because we had a quarter system, where essentially you had two-hour courses. They were three-hour courses that ran ten weeks, but because of the number of courses offered you had a lot more flexibility in programming than you do in a traditional semester system with sixteen weeks of three-hour courses. And the program did well under the quarter system. When we went back to the semester system where there was an urge to reduce registration costs by reducing the number of courses offered then you lost a lot of the meat of the program.

MC: One of the things, which you said was when HRP was terminated. Why was it terminated?

PM: I think we're getting ahead of ourselves here, Michael.

MC: Okay.

PM: I just wanted to talk a little more about the program at Virginia Tech because I think one of the things that people find interesting is how these programs were established in the South. And we have talked to Bob.

BS: Sheaffer?

PM: No, at Auburn.

BS: Bob Lanford?

PM: Yes, and asked him to speak about how that happened and so on, which is why I'm asking these kinds of questions of you right now.

BS: Okay. It is interesting and I'm not certain anybody really understands what all was involved. Part of the thing at Virginia Tech was we had a very aggressive, at that time, division leader, John [Hodgson ?], and John was very politically astute. Virginia Tech was a forestry school that had just, relatively new,

searching for a role, and John was wanting to find unique programs to give them identity. And he had been talking with people in the industry and they thought that this was a need. The industry groups that we had as supporters, both of the equipment industry and the forest products industry, felt this need for these people. And this was a period when the industry was still on the upswing. It was still growing and there was a recognition that you needed the procurement end, so Virginia Tech picked that one up. There was still a feeling that the secret lay in forest engineering, so Emmett Thompson, who had been at Virginia Tech, was dean at Auburn, put together the Forest Engineering Program there. The emphasis between the two programs were, was quite different. See Bobby had worked for us at HRP. He'd been a protégé of Tiberius Cunia, who was a Canadian, who came down to establish standardized rates and times for woods working and that's what Bobby's emphasis had been there. But he tended to go, Bobby went back for a Ph.D. in statistics with Mike and he tended to be much more the quantitative, where quantitative was part of what we were doing but in many of the efforts we tried to put a broader context to it. So what we ended up with was the Forest Engineering Program at Auburn and Industrial Forestry Operations at Virginia Tech.

PM: Is the program at Virginia Tech similar today as far as you know?

BS: It has changed considerably. I think it's lost or it has transformed into a shadow of what it was then. There have been several reasons for this. One was there was a period there where wood was fairly easily acquired. The great concern over environmental issues in the 1990s, specifically the certification related issues and soil and water. Forestry runs in cycles. One group will get the bit in their teeth and they'll run for a while. Then another group will get it. And all of a sudden the concern of soil and water preservation took the major emphasis. In other words, land management got control of forestry and procurement was relegated to a second level position. And that was very much the case during the 1990s, culminating with the certification efforts, SFI [Sustainable Forestry Initiative] being the one that's common here. And during some discussions with various groups about SFI, they say procurement is nothing to do with this, it's a land management problem. Well, procurement did because the land management issues affected procurement, which affected the vitality of the forestry and because we didn't deal with the entire system, my feeling is we've left the forestry economic sector worse off.

PM: All right, to change the subject then, we'd like you to talk a little bit about the period in which the pulp and paper industry expanded in the South, when the wood dealer system came into being, the kind of labor, it's agricultural roots, and that sort of thing that was drawn upon.

BS: Okay, I'll give you Bill Stewart's version.

PM: That's what we want to hear.

BS: It may or may not. It's like my teaching. I say I teach in parables but many won't make it to the Bible. [laughter] These are personal observations that have been pieced together from bits and pieces of local history. The South has actually had two stages of major forest production. The first stage began immediately after the Civil War and ran through the 1930s. And this was the era of the big mills. We describe them in a thesis I gave you as the era of steam and steel, where we made that transformation. And much of the areas of the South that had been unreachable because of transportation costs of both wood to the mill and from the mills to the market opened up with the railroads.

MC: And this was sawmills?

BS: Sawmills, yes, and that period lasted up through in the East into the 1920s and this area up through even into the 1940s and some into the '50s. But the advent of forest products coming from the West coming on line starting to displace some of the southern pine in the markets and the general cut out of the stands of native timber led various groups to start looking at what are we going to do with this forest. The one, there was a major effort to get newsprint production down here with Dr. Hurdy and the Hurdy

labs in Savannah and some operations in Texas. But southern pine did not do well as ground wood. The resins tended to produce a lower quality paper, stones burned easily, and the product did not match up with the spruce fir from the Northeast. But the Swedes came on to a process called the kraft process, which was a chemical pulping using a sulfate, Imodium sulfate to dissolve the lignite. Instead of tearing the wood apart you essentially dissolved it. And the owners of the mill at Roanoke Rapids, North Carolina got intrigued with this so they conducted an experiment of sulfate pulping that they sent to Sweden to be run through refiners, made into paper in England, and the paper came back as being of excellent quality. It was strong, hence the name Kraft, which you're all familiar with.

MC: What year would this be?

LG: This would be 1900.

BS: 1907-1911 I think was when they first. Well, they made the first Kraft production that went in was Roanoke Rapids and that expanded. Dantzler Lumber Company here in Mississippi then hired the engineer or mechanic who had put the process into place in Roanoke Rapids and came down and built Moss Point because they were looking for a product to move in behind their sawmill. They had been a major saw milling company. They had the land. They had the timber. They had the railroads. All they needed was a product. Well, it spread from here. There was a, I'm trying to think of the name of the mill in Texas. But there was a southern pine mill in Texas and this Kraft all of a sudden opened new gateways. By 1920 it was starting to be used as packaging paper. Linerboard came on and all of a sudden now here we had a product that was in demand that could be produced from our second growth poorly formed southern yellow pine timber. The places that enjoyed the major advantages were actually those on the east coast. The Albemarle Mill, the Roanoke Rapids mill spawned, the West Point Mill in Chesapeake Old Mill, the one at Hopewell, Virginia and it spread up and down the east coast because they were closer to what was then the major markets. It was easy shipment to the New York, Philadelphia, Chicago by water. But there was also an interesting thing that had a major affect on the industry. It was called the Roanoke Rapids rate. They were trying to negotiate a way to move this wood into the mill by rail. So they struck a deal with the railroads that the railroads would haul the wood in at a reduced rate in exchange for the right to haul the product at full value to the market. And one of the conditions of that rate was the wood had to be loaded crossways on the railcars and had to be shorter than eight-foot lengths. So they were guaranteed it was pulpwood. It could not be converted into a saw log later on. And this is one of the reasons for the five foot three inch stick of wood down there. Now there's an argument that some Tayloristic engineers or work study people came down from Canada and determined that a five foot three inch stick of wood southern pine weighed the same as a stick of balsam or spruce. And there may be some truth to that but this five foot three inch that could be loaded crossways on an eleven-foot railroad car, be hauled without tearing out all the structures, the railroad, and could guarantee that it was going into a pulping process rather than into a lumber process. But the initial expansion was largely along the coast, down through Charleston, Georgetown, Savannah, Fernandina Beach, and then around and into the Mobile area. And there was a fair amount going on in Texas to serve the western market and Louisiana. But these mills spread fairly quickly in commercial time. You've got to remember, this is the 1920s, 1930s. There was considerable reduction in activity during the Depression but then it picked up again after World War II. Mississippi here kind of got left behind after the Moss Point expansion. The next era of expansion here was IP's dissolving Kraft mill at Natchez, which was put in my understanding is to make cigarette filter material. When Marlboro came in, IP was [the major to manufacture filters cellular?].

MC: What year was that?

BS: That would be 1949-1950.

LG: And most of these are outlined either in Lance's thesis. That's the wood supply system or in the Oden dissertation in the 1970s.

BS: I'm working for memory so I would suggest you check the dates. Oden tells the story fairly well and you can use that to verify the dates. But Mississippi because our first contact or first harvest was late, things stayed on here longer than they did in many of the eastern states. Then the pulp and paper did not really hit here hard until the early 1960s. I think IP's redwood mill went in in the early '60s. St. Regis built the Monticello mill in that same era. Columbus came in in the '70s. And the Bowater mill, which was a thermo mechanical pulping mill came in in the 1980s. So things spread slow but it was a pressure on the resource that followed the market expansion.

PM: And the development of the Kraft process was a real impetus incentive?

BS: Yes, that was what made the southern pine industry develop. And the Kraft, of course, was an important packaging material. And this was a period where commercially we were moving into a packaged economy. You no longer went and got a unit at the store that was scooped out in a scoop and you put it in your container to carry it home. So between the use as a board, as corrugated containers, and as paper bags, that really led to a major expansion in the 1950s and the 1960s. Now the South when you look at it as a region you can't separate the forest from the landform. And when you're working on the east coast you tend to think of the landforms as the coastal plain having one identity, the piedmont having a second identity, and then the mountains having a third identity. And they do. They have a separate, by their names, they are physiologically different but they're also very socially different as well. The coastal plain area starting lands east of the fall line, and the fall line is where the last rivers break out over solid rock and enter into the old residual beaches and there's a falls there. That was a lower limit where you could depend on waterpower for manufacturing. It was the upper limit for navigation on a lot of these streams. So you have towns like Richmond is on the fall line. Charlotte is close to the fall line. Augusta, Georgia is on the fall line, Montgomery, Alabama. And what was east of there, the agriculture that developed early on was largely rice, indigo, and then later cotton, but it tended to work the lands nearer the rivers.

LG: And tobacco.

BS: And tobacco, the tobacco in the Carolinas and down through Georgia, the bright leaf belt. The lands that were less accessible, less arable, were left in timber. Some of it was worked for naval stores. There was quite a naval stores trade that came from blazing trees, hacking faces and collecting the turpentine. But those lands were available then for lumber production and as soon as we got the steam driven mills where you had power to convert the trees into product. And they were logged over heavily in that period. Many of those, after the war, many of those plantations that had been agricultural had to be sold to raise capital and they were purchased by lumber companies and converted into the timber. By the time the big trees were gone the lumber companies were at a point where they were ready to move on or to go bankrupt in place, as the case was with many firms here in Mississippi. So that land was available for the pulp and paper industry to move in and take over. And when you look at that area many of these old landholdings that were agricultural plantations then they became lumber companies, now they're pulp and paper ownerships and now they're moving on into the REIT category.

MC: What's REIT?

BS: REIT is a real estate investment trust. It's an investor based land ownership where they are not tied to a manufacturing firm. They're looking at timberland as being an investment rather than a raw material source. Now when you round the tip of the Grampian Hills in Alabama and get over onto this side then you end up in a less well defined physiographic area.

PM: Is this the piedmont?

BS: Well, the piedmont is between the, no, the piedmont is mostly in the eastern part, on the eastern slope of the Appalachians. When you come around here instead of this being an erosive outflow from the mountains, much of the land formed here is alluvial as a result of the Mississippi action and [aoleon?] as a result of the last ice age. Much of Mississippi's land, the minerals probably originated in New Mexico and Arizona and blew across Texas and landed here.

BS: Let's go back to the east coast again. One thing that we may have gone through too quickly, not all of the lumber mills passed on and then were replaced by pulp and paper. There were some companies that made the transition. One of the major ones of these was Yellow Camp Manufacturing out of Franklin, Virginia. The Camps, there had been a sawmill on that Black River since the 1850s. The Camps were operating it and they looked around, saw the opportunities in Kraft pulping. They were forty miles from Roanoke Rapids and they built a pulp mill. Well, one of the interesting things that happened with that mill was in the logging days they were dealing with local entrepreneurs who had become major suppliers to the sawmill and when they made the transition to pulp and paper they kept those major loggers as essentially direct suppliers to the mill. They didn't go through intermediaries. They were Taylor and Thayer, Temple and Rand, a variety of names that go back a couple of generations.

MC: And these were companies that actually did logging? They hired workers and did logging?

BS: They did logging, oh yes, they hired loggers, they owned machines.

LG: Well, it's a combination. Some of them actually had their own employees doing the logging. But some of them also hired these independent contractors, what we now call an independent contractor. They were local entrepreneurs that served as direct suppliers for these mills. So it really was a combination of different methods of supplying those mills. But some were their own company crews. There were an awful lot of independent logging contractors producing logs, not pulpwood but the logs.

MC: But there were no wood dealers?

BS: There was no wood dealer intermediary. The mill procurement man dealt directly with the logging company. Now in the case of many of these like Temple and Rand, they had multiple crew operations. They were set up much like some of your Canadian contracting firms. They worked for the company. Now the mills also may have maintained a cadre of smaller contractors to work off the company land because our land ownership is mixed up. It's a mix of corporate land and private lands and you wanted wood coming from both. But the direct supplier system was used by several mills. Union Camp being one that had a good direct supplier system. Buckeye Cellulose out of Perry, Florida set up a system like that in the 1950s. Bowater's mill in Calhoun, Tennessee also relied heavily on a direct supplier system. They might buy some dealer wood but the majority came from contractors that dealt directly with the mills. Other firms who chose to go a different route went to what we call a dealer system. And this was a way especially where you were dealing with a major share of your wood supply coming from land that was outside of company ownership, thirty, forty percent. And the way this worked in the East a lot of times was a company procurement officer would go out to a local community where there was timber around, get with a local entrepreneur, and say I'm going to put a railcar on the siding here. I'll give you a buck a cord for every cord that you arrange to put on it for this price. And that entrepreneur, at that time he might be the local fertilizer and seed distributor or somebody else, would then take responsibility for getting local people to cut and deliver the wood to that wood yard. And next Tuesday when the train switched, the railcar would go to the mill. He'd get paid and then he'd pay off the people that helped load it. And this was a way to start the wood flowing in from all these small tracts scattered over the countryside. And that with time and as the demand for wood increased, this moved from being a part time occupation for the fellah that ran the store or the service station or the fertilizer plant, into a fulltime wood dealership system. And some of the dealerships got to be considerable size, like S. A. Allen out of Savannah and others up and down the coast. But what we had starting there was a divergence in the way that the wood supply comes in. One was a company took responsibility for much of the procurement

internally and then depended on contractors to do the cut, skid, load, and haul. In the other case the company put all of the procurement responsibilities onto the dealer and then the dealer took on the roll of finding and building the cadre of loggers.

PM: One of the factors distinguishing the two systems you mentioned was whether the company owned its own land or not or a good percentage of it. And another that I don't know if this is true or not but I'll suggest is did it have anything to do with the origins of the particular companies? I mean were some regional in the sense a part of the region whereas others were external and coming into the person?

BS: To a certain point it was but things don't sort out that simply. Union Camp or the Camps were a local company. It was a natural outgrowth of their lumbering operation. Bowater, the Calhoun plant, came in during the Korean War. Part of the requirement for them to get the steel to build the mill was they had to have one acre of land for every cord of annual consumption. So they bought up a lot of scattered small blocks. They came in with no land base. But the attitude of the man that they hired to be the woods procurement, their woodlands manager there, was different. Now whether, he came out of Michigan and whether his experience, much of this methodology is acquired not from education but from experience and also what works for that particular individual. And they developed approach. The other Bowater mill that came in shortly thereafter at Catawba in South Carolina was a dealer mill, a dealer supplied mill. So here you have one company running one mill with one philosophy within two hundred and fifty miles of another mill operating with a totally different philosophy. They both worked. It was always good for an argument but the fact that they functioned.

LG: One of the other distinctions that I didn't really realize until I came to Mississippi is the distinction between pulp wooding and logging as well, logging being the large timber for lumber production. And even to this day there are people who take great pride in either being a logger, supplying sawmills, which is where you had more of the direct purchase system from the saw milling background, or I'm no logger, I'm a pulpwooder and I'm proud of it. There's still very much distinction here.

BS: Can we hit pause a minute and let me get something?

LG: Moving down here to Mississippi people are very proud of that origin, whether they're in the pulpwood business or the logging business and they make that distinction very clear. I'm a pulpwooder, I'm not a logger. That was not a distinction that I ever noticed on the East coast. I spent some time working for Chesapeake Paper as a summer student for a whole winter. They didn't have another job title but that distinction I never felt sort of coming up professionally in the East. Coming down here I stuck my foot in my mouth starting a logger education program and people were telling me no, we're pulpwooders. We want this education but we're not loggers. We're pulpwooders and we're proud of it. A lot of the direct purchase system down here and we still a lot of it tends to be more related to sawmills and the logging side of it, where these independent contractors work on private land not owned by the company and that's sort of the way it's always been. Going back to the logging textbooks from the 1930s and 1940s, some forty percent of the logging down here was direct purchase, not company.

MC: Now when the companies were logging or pulp wooding their own land, how did they get it done?

LG: A combination of whatever it took. They did use some of their own employees but the labor laws were a lot more flexible back then. We didn't get our Fair Labor Standards Act until 1938, which sort of defined who was an employee versus who was an independent contractor and the responsibilities. So really up through 1940 it was kind of hard to tell if they were truly working for the, directly employed by the company or employed by a logging contractor working under some type of contractual arrangement. Looking back at some of the old court cases in Mississippi, there are plenty of examples where it's fairly obviously a contractual relationship between a private entrepreneur working on company land and providing the logging services to that company as opposed to simply the company employees doing that.

PM: Who would bring the cases, as a matter of fact, would it be employees?

LG: No, actually the one I'm thinking of is one that haunts me to this day, deals with county supervisors and our local governments. A suit was brought in 1906, Covington County, Mississippi I believe, where the county supervisors were forbidding the use of any steam tractor engine, basically a mechanized skidder that this contractor was using to move logs from the woods to the mill and the county supervisors did not want that mechanized monster on their county road because it was carrying the horses. The supervisors won. The supervisors still have total control over local roads and if they don't like the log trucks, the log trucks don't run. It really depended, I got into this looking at some transportation law but a lot of it the supervisors would bring suit. Local landowners, local farmers would bring suit because their horses got scared. It just sort of depended, particularly in the early days of motorized equipment.

PM: And, of course, the big problem would be who do you bring suit against I think.

LG: Yeah, and generally both the contractor and the purchasing facility were named. Generally the contractor was the one and it was found to be a contract so the mill wasn't responsible, which is the round about way of determining, yes, there was an independent contractor system and a direct purchase system as well.

BS: There's a quote that I had to go, that went back. This is from the [Brockway Saga ?], which is a little publication of a small town historical society based upon newspaper articles from the Brockway Record at the turn of the century. And the title of the couple of paragraphs, if you'll abide with me, is Woodsmen Have Their Standards. At this time there was a paper mill in Johnsonburg, Pennsylvania. I believe that it was a South Pike mill at that time producing white paper. Said W. H. Cocker, in speaking of paper wood industry said that a sentiment exists among a certain class of woodsmen that is degrading to do anything in the woods that departs at least from the tying them on or custom incident to lumbering. A year or two ago I jobbed a lot of paper wood and I had the hardest kind of work getting men to cut me the wood. The same sentiment costs me fifty cents more a cord for my wood than I would have thought to have paid. But hunting for workmen I invariably met with a contemptuous refusal just as soon as I made known the nature of the work. Nah, would be the reply. I left home when I was a kid because I had to cut wood and I won't do it now. The only way you could get hands at all would be to pay more per day that woodsmen were receiving elsewhere, even though I had to humor them by getting a dozen or so peaveys, a tool for rolling logs for them to use in rolling the five-foot timber about. We didn't need peaveys but it made men think it was not a degrading task to cutting wood. Then too I got a quantity of lumberman shoe [cocks?], which I kept at camp to supply the men as they wanted them. So by paying more money, by giving a peavey sticking in the ground where the men were at work, and keeping them well supplied with shoe [cocks?] I managed to keep a crew. It may sound a little off color but it's the solemn fact.} So the transition, there was a difference drawn between a logger and a pulpwooder. And generally in the perceptions of many people, pulp wooding was a more degrading form of work. It was less heroic. You weren't handling big trees. You weren't dealing with the same magnificence of effort that you were in harvesting soft timber.

And when you came south there was another industry here that played a major role but we haven't discussed that much except on our tour this morning, and that was the production of railroad ties. For a long time we ran a tree line industry. You had the soft timber and it might be pine or hardwood because there was a lot of hardwood cut along the river bottoms and in the mountains. And then you had the pulpwood production. But the tie hacking, making of railroad ties, stayed as way to utilize low quality hardwood up through the 1940s and the 1950s. When the railroad tie production was both by at one end it was by tie hats and these were fellahs who went out in the woods used a broad ax. Cut the tree down with a cross cut saw, used the broad ax to hue two sides and then they would bring the wood out either by horse or by tractor and sell it to a treating plant. The other alternative was to take a ground mill in, which would be a small circular sawmill, set it up on site, slab four sides, and then sell the square ties to

the treating company. Hence we saw Sturgess this morning, crosstie capital of the world for thirty-some years. The claim was that people could remember railroad ties stacked six foot high on both sides of that railroad for three or four miles out of town as that wood was brought out of these hardwood flats here. You talk to many old people in town and yeah, I worked the woods. Boy, I hacked many a railroad tie.

MC: How long is a tie?

BS: A tie, let's see, I'm trying to think, eight foot, ten inch? I've forgotten the dimensions right now. I'm having one of those senior moments.

PM: But it's quite long?

BS: It's eight by eight by over eight foot long.

PM: Right, the reason I asked is getting it out from the stump, so they'd be basically skidding that out one or two at a time?

BS: Yeah, generally what they would do is go in with a horse. They'd cut the tree down, hack the tie in place, then skid the tie out to a woods roadside where with either a horse or a mule or ox and then bring a wagon by and load the tie up and carry it into Sturgess or wherever the marketing place was. Later on the animal power was replaced slowly by trucks and by farm tractors. But railroad tie production was a significant part of the output, particularly down here in Mississippi and up through the mountains. We didn't have the chemical wood markets that they did further north. There was some, some of it. The chemical wood was generally charcoal, charcoaling process of making wood extraction. But the other parallel industry ran that if you couldn't get on in pulpwood then you could get on in the turpentine industry. And that was the next level down in the labor hierarchy. The logger was one step then the pulpwooder then the tarheel, the person who was emptying turpentine stumps. Quite often that was work for men, women, and boys.

MC: Where did the railway tie hackers fit in?

BS: Tie hacker fit in somewhere probably between the logger and the pulpwooder.

LG: It was solid wood. Therefore, it wasn't going to get chipped up. It was turned into something that was a solid product. Therefore, it was a little higher value than that paper wood, which was going to get ground up or chipped up.

BS: And there was more skill required, to be honest, to take a broad ax and a double bit and hue a straight tie.

LG: And I suspect a lot of this hierarchy did deal originally with the skill level required to do the job.

BS: But if you read *Gone With the Wind*, after the Civil War the thing that Scarlet O'Hara did to recoup her social and economic status was get into the lumber business. That story was pretty well told across the south that after the war timber was one thing that helped bring the market back up. Tobacco enjoyed an advantage because it was a crop that could be handled without a great deal of capital investment. But when you got in to any of these other crops that required a significant capital it was hard for the South in the Reconstruction era and the post Reconstruction era to come up with that capital. And timber was one thing that attracted a great deal of capital into the region. And so that's where the lumbering came from. When we look at the companies here in Mississippi I keep coming across names that I knew in Pennsylvania. The [Goodyears?] were out of the Catasauqua, Pennsylvania, Potter County, Pennsylvania era. They came down and they put the mill in at Bogalusa, Louisiana and they brought with them the railroading technology that had evolved in Pennsylvania, the climax locomotives, the

[Barnhart?] loaders. You find Johnny Dubois who was a name very familiar in that section of Pennsylvania, C. M. Carrier, and you start looking at the history of some of these firms, many times it was wood dealers or lumber dealers out of the Ohio base in Cincinnati or the Midwest or Chicago put up the money to support one of these firms moving into the area to bring their steam technology, their railroad, their sawmills or their loaders down, and exploit the timber here because the local people, with some major exceptions, couldn't get the capital together. There were some firms like the Dantzlers and Dinklers and so forth that managed to stay on. The WestVaco mill in Summerville, South Carolina or North Charleston, they drew heavily on the purchase from Frank Jones Timber Company. Well, Frank Jones was a company that was involved in the lumber production here and they're one of the few that went from the west to the east and ended up in the North Charleston area. But the big problem in this region was getting the capital together to make the transition from these largely labor intensive, tie hacking and selling of wood in the round into a mechanized process. The first flux of that was with the lumbering, the boll weevil, the Depression, again stripped the capital base out of the region and pulpwood was a way to bring it back. So Scarlet wasn't the only one that depended on the forest to get her feet back under her after a disaster. [laughter] Where do we want to go?

PM: So with the what, the period of the 1950s, you know, after the time of the Depression, the boll weevil and the availability of the resource again, that seems to have been a period in which the resources produced using local labor sometimes under a wood dealer system, local labor attached to agriculture.

BS: Let me back up a little bit. We didn't complete our physiographic tour of the South. When you look at, as you round the Grampian Hill on the east side you have a fairly neat petition. You have the coastal plain, which ends at the fall line. And you have the piedmont and then you move up into the mountains. Around here the way Mississippi was put together by various chronological forces, we end up with the coastal zone, which was settled early on. Immediately behind that there's something that's called the pine belt and this was lower fertility soil, quite often sandy, that extends roughly from the coast up through I-20 where it runs across the center part of the state. That land was not particularly suited for the cotton culture that came in and much of it was left in subsistence farming, subsistence farming and wild land grazing. So in the post war period these were large stands largely of longleaf pine with very little under story because for wild land grazing you burned them off regularly. Then as you come north of that you get into the hill country. And the hill country is like some that we saw today. There's rolling hills. They were moderately fertile soiled. There were some very good patches in there, the black prairies that were intentionally developed for cotton. And most of our agricultural entrepreneurs came in from Georgia, South Carolina, North Carolina, so after the Indians cessation, they could identify the good land for cotton and they tied that up and these became the large operations. The next wave that came in was restricted to smaller operations in the hill country and some of this land was cleared, some of it was left in forest. But it was a much heavier mix of agriculture and forestry or forestland. Well, when the logging industry moved in they tended to concentrate heavily in the longleaf belts. We didn't get the big mills up here. We ended up with a lot of smaller mills that worked these small tracts, may not have had a railroad associated with them. They were still using animal power to transport the logs to the mill and then the lumber to a local planing mill or someplace where it was marketed. So with the demise of the big mills much of that logging infrastructure in the South went away. Up here we had had the small mill being the merchant. He would buy the timber and people would deliver it to him. He'd either buy in on the wagon when it came in or buy the lumber. And that system was not adequate to support pulp and paper industries. Because there was no infrastructure in the pine belt, the dealer system was brought in from the east to handle the coordination of wood flow. Mississippi at the end of World War II was a state with abundant trees, a lot of agricultural labor that had been displaced by mechanical cotton harvesting and agricultural chemicals, so there was no need for a heavy capital investment. If we could get enough trucks, enough people, enough chainsaws, enough Igloo coolers, we could provide most of the mills but you needed somebody locally to pull those resources together to create a production force. And that's where the dealer system came in here very strongly. And the same was true in the piedmont areas back east. The piedmont belt tended to be more heavily dealer oriented because again, with the change in agriculture there was a great deal more labor availability. The piedmont did have an advantage in that it

tended to industrialize so there was other outlets for the surplus labor. Mississippi's industrialization lagged. We just didn't have anything for the people to do here. Cutting pulpwood was one way to make a living, to survive.

PM: So one of the conditions that encouraged the facility of the dealer system to develop was a pretty good supply of a kind of a latent labor force ready to be used?

BS: It was a labor force that was largely uneducated, having agricultural skills rather than industrial skills or industrial type skills. And so they were very easily brought into a task that was, I would consider pulp wooding a moderate skill level. You needed enough skill so you didn't hurt yourself or didn't kill the people you were working with. But it was not a high skilled machine shop, not to a machine shop level. And because our forests and our people are so heavily intermixed, this labor force was available locally. You didn't have to worry about getting them into a camp some place up in the bush. And so the ability to produce pulpwood was just a natural extension of they would do part time farm work when you needed them on the farm. They were available for part time woods work.

PM: So perhaps we could talk a little bit about the relationship of the cycle of growing crops with the working and the production of pulpwood.

BS: Many of the cash crops down here, the high value crops, were crops with very high labor needs at short periods during the year, tobacco being the major one on the east coast. You needed a lot of labor at seedbed preparation, transplanting, and then until the crop got established. Then there was a falloff in the need until a time for priming, going through the various passes pulling off the various leaves. So what you had were planters who had maintained a sufficient pool of labor, generally provide housing and support for them to make certain they would be available during those periods of time. When I first came south, for example, when it was harvesting tobacco...

MC: Rough date then?

BS: Rough date would be mid '60s, '65-'66. You didn't count on any wood production during the bright leaf season because all the woods labor would go work in the tobacco field because they could work with women there and it was a family type thing. Where going to work in the woods was not anywhere near as exciting. And then the landowners would themselves either use that labor for harvesting wood during the off season or it would be available to a pulpwood producer to work with him. As you got up into the piedmont you ended up with many small farmers who had eighty, a hundred acres, a hundred and twenty acres and they were very much like the northern logger. They would farm from mid April to mid October but during the winter months work in the woods was a way to provide employment. And there would be some wood produced in the summer. Well, we're here in Mississippi and through other regions where cotton was king you had a similar for tobacco, as you did with tobacco. You had a very high need for field hands to chop cotton when the field was getting established. And then much of the picking prior to the advent of the mechanical harvester was done manually, which there was a major need for field labor. And prior to World War II keeping this field labor available was a major concern. It was one of the things that led to some of the social, societal disconnects in this region was you were afraid you would lose your field labor if you made these social advances. But in the '60s the advent of agricultural mechanization, agricultural chemicals was reducing the need for this field labor. So then wood production could be a more year round operation. But at the level of technology we had then with largely dependent on farm tractors and trucks, that seasonality was not as nicely drawn because you had the period from the time of leaf fall until bud break where the ground turned very, very soft and so you weren't able to log in the wintertime. So you ended up with a competition during good weather between agriculture and wood production for labor. And you had this span in the winter where you had labor available but the ground wasn't available to log.

PM: Nor were agricultural.

BS: No, there was no agricultural activity taking place. As agriculture became more mechanized and greater reliance on chemicals, much of the agricultural labor became, there was less of it and agricultural employment became full time employment because with tractors and so forth you could engage in other farming activities on a year round basis. And when you got into other crops rather than it being single crop tobacco or cotton, got to growing corn, soybeans, sweet potatoes, and so forth, that changed the rhythm, the agricultural rhythm and led to more full time agricultural employment.

PM: Were the field hands mostly employed on a wage labor basis?

BS: They were employed, well I guess you would call it wage labor. A lot of it was on a production basis. He'd get a group, the old three men and a truck system. One guy would own the truck and the other two would work for him on so much a cord. It was not hourly basis but it was a very primitive form of profit sharing if you will.

PM: In their agricultural activities would they be employed on a wage labor basis?

BS: If they were working as a sharecropper and quite often what this would mean is they would be given a patch of land to grow their crop on.

PM: Would they own it?

BS: No, this would be part of the employment agreement. Then they would be given a house to live in and they would work for the landowner in exchange for a given share of the crop, hence the name. When the crop was laid by, when it was sold, well, during the year the landowner would assume responsibilities then for a minimal standard of living. They would have an account at the local store where they could draw on it for food and draw on it for clothing, an agreement with the doctor where there would be a certain level of medical care covered. Then when the crops were sold there would be a settling and you would settle down and you would figure out how much your debts had been during the year and that would be subtracted from your share and whatever was left over you would get half.

PM: So just to make sure I understand this clearly, the landowner would have his land kind of divided and allocated to a group of sharecroppers each of whom would work that one bit of land by himself and then you'd have it repeated throughout?

BS: Well, there were all kinds of systems worked out and you'll have to get into somebody who is more into the agricultural marketing at the time. Many of these sharecroppers there was a small tract could be a garden plot and then they could grow a cash crop but it would be small. But they would work any part of the property as part of their agreement with the landowner.

PM: So not all of the property would be assigned to sharecroppers?

BS: No, the sharecroppers would have only a small share but then they would have a right to a larger, they would have a cash market for what they produced from theirs but then they would have a share of the larger crop that came in. And some of these systems were fairly brutal. One of the things that did not do it led to a very paternalistic society rather than a capitalistic society. It did not prepare the participants well to move into a market economy where they sold their skills, they got their money, and then they were responsible for their own food, housing, and medical care. And it led in many ways it was an extension of the old plantation system. It was an attempt to move from a plantation type society to a manorial type of society but it didn't make the transition. It's like most things. Those two systems sound very neat when you read about them in a history book or a sociology book. But in reality they kind of flow together and there's that very messy margin. And unfortunately, we had very few pure and a helluva lot of this messy margin between the two.

MC: Now the way that many people talk about the wood dealer system is that it essentially was the idea of the pulp mills coming in. But this kind of sharecropping system and its need for lot of agricultural labor must have created huge debt relations with local wealthy, powerful people. Did that not have anything to do with the origin of dealer systems?

BS: Yeah, that had a good bit to do with it. There was also, one of the things that you find as you investigate, the large lumber companies made the history books. But there was a great many small sawmills that produced wood that left no legacy, no written legacy other than a sawdust pile or a trampled piece in the woods. The way these worked down here, for example, many of these tie mills we talked about. That small tie manufacturer would not have the ability to market his ties to Kerr McGhee or Coppers or whomever. So there was a tie buyer that would come around and he would buy these ties so essentially he was the intermediary between the market and the producer. The same thing was true with a lot of this other production. You had a local broker, a local aggregator of production that then approached the larger firms. And the dealer system I think was probably in place but it was just a formalization for this industry of many of these smaller relationships that existed.

LG: You're kind of describing the old ground mills too with the concentration to the dry kilns and planing mills and you might want to explain that because I think you've got the corporate down as well as the grass roots up, and the truth of how it really evolved is back in that messy margin.

BS: Yeah. Well, to give you an idea of why I'm talking about these small mills, one of the interesting things that we encountered in the work for lands was in the history of the Frick Company out of Waynesboro, Pennsylvania, Frick was a manufacturer of small portable sawmills and steam engines, traction engines. Well, when Lee raided on his way to Gettysburg, he went through Waynesboro and at this time this was an old steam driven manufacturing machine shop with a lot of belting. Everything was run off of jackshafts and belts. Well, the Confederate army was desperate for shoe leather and for harness, so they left the machines alone. They stripped all the leather belting out of the plant, which shut Frick down. After the war the southerners wanted these small mills and what Frick would do is put a small mill up on a railroad siding and then they'd come by six months later and pick up wood that they'd take back to use in their manufacturing process. It was a barter system. But they struck an agreement with some of the southerners to replace the leather belting so they could get back into production so we could get sawmills. This is not documented by southern history. This is in the chronicles of the Frick Manufacturing Company. So that tells me that there must have been a lot of these smaller mills down here who went through a lumber broker, that those lumber brokers in many instances matured into dry kiln and planing mill operations. For example, Fulghum Manufacturing out of Wadley, Georgia was a major manufacturer of trip mills has been a supplier of equipment to the industry for forty years. They got their start as operating a planing mill and the planing mill was essentially was a concentration yard for all these ground mills. They would dry the lumber, plane it, and then they would sell it on the market. So the dealer system as we know it had other manifestations in other industries and other sectors of the forestry economy that probably if you're dealing only with the pulp and paper industry you don't understand that this was a local social structure that was just captured by this industry as a matter of convenience and put into place. If you've got something here that's functioning and is part of the local scene, why go create something different and bring it in on top of it. We'll just make our version of it and put it in place.

MC: Well, of course, that's the Canadian question. Wasn't this dealer system more costly in terms of the amount of wood, cost, etc., mills? Why didn't they come in here as good capitalists and just take over all the labor, organize everything, bring in the most productive machinery, and just run her like a factory?

BS: That is fine when you control the land, when you control the land access. But when you're dependent upon anywhere, well, I mentioned Bowater, the Calhouns. The feeling there was that they took one cord of wood to make one kind of paper. Therefore, if we had control a number of acres equivalent to our

annual production and we could do exactly what you're talking about. The difference was when it came time to get together that five hundred thousand acres was it didn't exist in a block. At one time they had I forget the numbers but they had something like thousands of miles of boundary line that they had to maintain because they bought forty acres here and ten acres here and twenty acres there and a hundred acres here and it was scattered all over the hillside. It soon became obvious that they weren't going to be able to acquire enough land to keep up with the productivity that was expected of the mill. You were going to be dependent upon private land. Now if you want to get into a situation where you are a prime candidate for lawsuits and legal difficulties, put one of these big industrial scale operations in on a private landowner where he knows if he takes you to court you're going to the courthouse five miles away and here you are the international company with all this capital resource and who's going to be on the jury, two of your cousins, your old school teacher, your preacher. Guess who's going to win. There ain't no question. So this mix of ownership types, a percentage of local ownership and just the mixed nature of the land ownership is a problem. Look across the pond there. You see that fringe of pine trees? The other side of that was Georgia Pacific. They log right up here, the backside PCA. I woke up one morning hearing saw heads running through the fringe of trees on the other side. I think it was PCA was logging that.

LG: PCA bought it.

BS: PCA bought it. A contractor working for PCA logged it. But you see the exposure and that exposure exists everywhere down here.

LG: One of the things that happened is, and I know this is going to be hard to convey on a tape but that block right over there that was Georgia Pacific, there were some errors made and the stream got blocked up. The neighbors would have sued Georgia Pacific if it was a Georgia Pacific employee but it was a local boy who eventually came back and made it right. But nonetheless then Georgia Pacific, big international corporation, and this is an example, this is one of the reasons this independent system has stayed in effect down here for so long and that we've really gone away from the company operations is the legal liability issues. And as many unemployed lawyers as we have you want to try to keep them unemployed. So a local business is doing the work. They're less likely, because they're local they're less likely to mess up to begin with, but everybody knows them. Whereas, if it's a large multi national corporation, that's another entity. They don't come from around here. They talk funny over there, you know. So that's part of the reason we've kept this independent contractor system down here is for those reasons.

MC: Canadians forget the litigious nature of American society. No courts in, Canadian courts are centralized. They are not going to award large amounts of money to local people on behalf of the corporations who are the funders of the politicians who run the state. And besides, our court system never gives out large amounts of damages to anyone.

LG: We have such a multi tier court system. We have the local county courts. We're got city courts depending on where you file and the jury's going to be local people.

MC: We also don't have juries for civil cases.

LG: And we do and they're going to be local people. It's not going to be the peers of the CEO's of the corporations because we're not going to go to Connecticut or Washington or Georgia to get a jury. It's going to come from the local community. So that makes for a slightly different set of working relationships as well.

BS: I made the statement before that forestry is a social construct not a science and engineering construct. And it's so integrated into the society here. Our trip this morning you saw as we were riding up and down the road there's forestry all around us but there's also people and homes and all of this other

context, social context. Now one of the things that it's also difficult to understand, perhaps not for you folks from New Brunswick where there's been the French and Anglo tensions and issues.

MC: Inequality.

BS: Inequalities for a long time. There's a great deal that's been made about the blacks and their difficulties in moving from the South into other regions of the country. There have been several books and this has not been well documented but you keep encountering it when you're reading stories. There's a book *Red Hills and Cotton* that deals with the South Carolina piedmont in the pre World War II era. And they make a point that it was very difficult for the southern white to move out too. So you tended to have a society here that went through a period of nearly eighty years that was largely internalized. And in some places like Georgia, the Atlanta area, it did become much more cosmopolitan. Richmond was more cosmopolitan. But this area where the forests were there was, the communities tended to be fairly close. There was no place for anybody to go and if you came in, by God, you were a stranger. When I bought a place in Gwinnett County, Georgia we were the second family that was not related that had moved in on a five-mile stretch of road in over eighty years. We were the foreigners. Everybody else knew each other, they were related, and you know, they could trace ancestry. They could count kin on several sides. Here we were the foreigners coming in. That changed very rapidly because they were close to Atlanta. But when you brought, as the mills that came in from the outside came in, they didn't understand the sociology necessary. And the local folks sure as hell didn't understand them. And if you didn't have this buffer of a local intermediary you could sure run into trouble quickly. There was a story again out of Bowater in east Tennessee. They wanted to get rid of the hardwoods so they could plant pine and this was in the days of the [Jim, Jim Injector ?]. They were going out injecting all the hardwood trees. Well, the local folks enjoyed squirrel hunting and squirrels like acorns and acorns grow on big old hardwood trees, oak trees. They came out one day and there was this four by eight sheet of plywood nailed up, scrawled on with black paint says you've got the money, we got the time, you kill our hardwoods, we'll burn your pine. And all of a sudden there was a readjustment, you know. [laughter] The folks didn't get upset, they just issued a warning and if you responded properly to the warning then you could reach an agreement. And there was an attitude of the, there was a lot of difficulty. As you read Eller's *Miners, Millhands, and Mountaineers* and read some of the other social histories of this region, you understand just how much of a cultural disconnect there was and still a residual of ill feelings from the Civil War up through the 1930s and the 1940s. It created problems for not just the companies coming in but the government. The Shenandoah Park in Virginia, when they came in in the '30s to create that, they got imminent domain and threw a lot of mountain folk who had only quick claims or claim to land, it was not well legally defined, they threw them off the land. Then they came back in the 1990s and wanted to expand the park. Well, they soon discovered that the children and the grandchildren of these poor dumb mountaineers that they had ejected put their furniture out in the middle of the road while they were in church and burned their house so that they wouldn't leave. They'd gone down and got jobs in the factories and their kids had become lawyers and doctors, so when the Park Service wanted to expand guess who they met in court. [laughter] But there was an attitude here that we can bully these people and the local folks have a variety of ways of fighting back when you start doing those kinds of games.

MC: And long memories.

BS: And long memories. The Forest Service, family lore has it, that they stole some acreage from my family to create the Allegheny National Forest. I have not forgotten it and I'm going to make certain my children understand what was happening. There were some funny games with a paid person in the Hyde County tax office not mailing out tax notices. So these cultural memories hang on for a long time and these resentments hang on. And so you have to have some local buffer or you did then, because society then was much more insular than it is now, to make these cultural transitions to keep things functioning smoothly.

PM: At one time, Bill, you spoke of factors.

LG: Factor system.

PM: And the factor system.

BS: Yeah see much of the southern agricultural economy ran on credit. And where a landowner could get the capital to run, we talked about the sharecropper, where he gets in debt until the crop is by, the plantation owner or the planter also had to operate on a similar system because capital was short and it was a credit driven system. So you would end up with people contracting their crop to a trader who would then handle the merchandising beyond. This was very common here in the cotton area and the same thing was true in the tobacco. When you read some of the economic histories of these plantations you realize just how deeply in debt they were and how committed they were to a higher level dealer system. And so this was very much a part of the economy the whole way through. And the wood dealer system was just a manifestation of that way of doing business. You loan me money. I'll produce something. I'll give you that in exchange to pay back. And, of course, the thing that kept this going was always keeping the producer in debt so that he would stay on. And this was the same with the bobtail system. You'd often have the truck financed by the dealer and money would be advanced. It was a common part of the economic structure at all levels. All the industry did was capitalize on it and make it work for them.

PM: Local reputation and reliability would count for a lot in this kind of system I suppose.

BS: It did.

PM: A man's as good as his word and that sort of thing.

BS: A man was as good as his word but there's also a certain thing too that you, there's a certain degree of respect comes for somebody who has figured out how to fiddle the system and make money you know. The preacher is admired at one level and the banker, but the rogue is also admired and unfortunately we ended up with both groups. You had some who were very credible, straightforward. But you also opened up the opportunity for rogues. Unfortunately in society there are more rogues than there are saints. So we ended up with some serious rogues too in the dealer system.

BS: ...is there wasn't necessarily a part of forestry. I think what happened, when the industry came down they picked up parts of a system that was already here and just elaborated on it and transformed it to their needs. And the fact that so many of these social structures are virtually invisible unless you're looking for them, make a difference because you don't realize they're there. You think you invented it but you didn't. [laughter] You just pulled the cover back and it came back to life. But no, we just refined it to meet our requirements. I'm no historian but when you look back to European oil trade and so forth the process was there. It comes with that level of cultural development.

PM: The next topic I'd like to talk about with you is the Battelle Institute studies. So maybe you could talk a little bit about, you know, the source of that, why they were employed, the kinds of things that they tried to do.

BS: Okay, there were some serious wood shortages that came about in the late 1950s. I don't have them memorized now. It's not something I've thought of in several years.

LG: There were two. One was '56 or '57. The other one was about '59. I read that about five years ago in some of his stuff.

BS: But what happened then was the labor, there was not adequate labor or people didn't feel there was adequate labor to get the wood out. Part of it was labor. Part of it was this dependency on the bobtail

truck system. Weather pattern changes you can't do much with that truck. So there was some work done looking at projecting the amount of wood to be cut with a steeply rising demand curve and looking at the population curve and wondering whether there would be enough people. Somebody had claimed it would take every man, woman, and child south of Baltimore to log the southern pine pulp mills that were coming in. So there was an agreement that we needed to do something to try to stabilize the wood supply system. And the American Pulpwood Association at that time was very active in issues of wood supply and harvesting and labor relations. So there was an agreement they contracted with the Battelle Memorial Institute to do a study of the southern pulp wooding. Basically what the Battelle study did was looked at the system, as it existed. Now there was some very early econometrics work done at projecting how the system could perform modally but some of the most important things they focused on was we had loading wood was a major labor consumer. At that time the three men and a truck everything was hand loaded even though it was a big stick loader, a small winch to pull the big sticks up. But you cut the tree down, cut it up into five foot three inch lengths, pummeled them into a pile, drove the truck up to the pile, then you muscled the wood up onto the truck from there. And getting a five foot three inch stick of wood up eight, nine feet in the air was no small task. And the log woods, then it was generally a three man loading crew because you used end grabs, a split grab coming off of a cable, put a hook in each end, lifted it up on the truck while you had one man operating the loader, one man on the ground setting the tongs or the end grabs, one man on the truck taking them off and it was very dangerous work. The loading was very hard work. You come out of that at night, as one fellah said, it made dead babies because after a day of loading short wood there was just nothing left. [laughter] They focused on that. They also focused on transportation, how to get wood from the stump to the road, the understanding being if you got it to the road then you could probably move it. So one of the outcomes of that was a great deal of emphasis on loaders and at that time the Swedes had been working with the Hiab loader. Bob Larson brought one over. He called it the Hibob, which started the knuckle boom medley then Leo Hannikan picked up and started the Prentice and of course there was a proliferation of manufacturers of the knuckle boom loaders, both small scale and medium size scale. The Prentice had the HOVC for cut to length logs and Tommy Fulghum was making a small one. The first one I had to fool with was mounted on the back of a little Allis Chalmers crawler that we used to pick wood up and put it in a pallet on a plate that you skidded around from location to location. The Battelle report pointed to the need for increased mechanization so there was an emphasis then looking at how do we mechanize these operations. As I said earlier in some of our earlier discussions, the change in agriculture, the civil rights movement, the expanding industrialization of the South was hitting the labor supply so there was a great deal of concern there. Plus the fact that many of the plantations were coming on line that had been planted as part of the CCC program in the 1930s, the Southern Pulpwood Conservation Association efforts and then the companies coming in and buying land. It wasn't uncommon for people to say that if you bought land and you had more than a dollar an acre after you cut the timber, you paid too much for it. But they would come in and cut off that second forest and plant again the third forest. And there was a tremendous expansion of small wood. Battelle had a second phase that they proposed but I think it was too expensive for the industry so their solution was to create the Harvesting Research Project. As I said, the first challenge there was looking at the Beloit system, which was a tree length system and contrasting that with the Bush combine, which was a short wood system. The Battelle study did a couple of things. One was it focused people's attention. Up until that time there was, the wood supply had not really been a major problem. There had been enough labor and so forth that people weren't really concerned about it. The emphasis was on getting these lands that they'd purchased under some form of forest regulations and the emphasis switched back then to how do you put together a logging force. That's about it. Some of the interesting things in the Battelle study was, one point I remember they claimed that the woods worker was making a wage comparable to employees of manufacturing firms of the region. The difference was the factory worker worked forty hours a week. The woods worker may have worked two, three, four days a week. So in the long run he came out on the short end of things. And that lack of a consistent pay, oh, they hoped that going to mechanization would also give a consistent workweek.

MC: One of the things that we talked about yesterday was the ill health and difficulties that a labor force in the woods had to really put out the kind of effort that was required. Could you put that?

BS: Yeah, there were several things going on. By the '60s malaria was finally controlled in what, '70?

LG: Seventy-three?

BS: Seventy-three, I think.

LG: We're not sure on the date.

MC: But it's in that era, the 1970s?

BS: It's in this era. One of the other things that was very common was sexually transmitted disease. Syphilis was rampant and I worked with crews where at that time it took a three shot sequence to cure syphilis. You'd take them, get the first shot and second shot. By the time they had the second shot they were feeling good. They wouldn't go back for the third and you would get into a relapse. The poor diet, they were getting the calories through fats but you weren't getting the sugars to provide energy. So you could work at a slow consistent pace but there was no energy burst. And there was a tremendous effort on the part of the land grant colleges to home demonstration units, both the traditional land grant schools and the 1890 schools through extension to try to do a better job of diet for the poor black and the poor white. The dietary problems by the '60s were being solved. There's still a few cases people who I'd see around town, you can tell that they'd had pellagra by the bowed legs, the outwardly bowed legs. But the numbers are much fewer than they used to be.

PM: That's a disease that's associated with what, what is it, eating grains?

BS: Niacin deficiency and it results in deformed bones.

MC: You also had mentioned hookworm.

BS: Hookworm was a significant burden down here, particularly among those who went barefoot and were environments of poor sanitation because it was a worm that got into the bloodstream and was debilitating. See one of the things that is, let's go back to malaria a minute. I think it's important to understand. One of the reasons for slavery in the South was the natural resistance of Africans to malaria. Malaria was fairly common. White labor here was difficult to keep, particularly in the low land areas because they were subject to malaria. Where the Africans, the same blood condition that leads to sickle cell anemia also helps keep malaria out. So it wasn't that we chose, or that the region chose for some malicious reason the abuse of poor blacks by making them pick cotton. It was because black labor was the only ones who could survive these semi tropical diseases that we were encountering. And the hookworm according to Dr. Robeson here was a serious force in Mississippi. Seventy-five percent of the undergraduates at Mississippi State in the 1930s had hookworm and a major share of the faculty had it. They picked it up and lived with it all their lives. And it didn't kill you but it just gave you a very low energy level, the same thing with malaria. Malaria you would go through the sweats. Once you were through that you were okay but it made for a very unpredictable life depending upon when you had a relapse.

MC: One of the things that you said yesterday that was amazing to us is at least the initial stages of trying to mechanize tree harvesting was not designed to replace labor but to multiply the power of labor that they needed because these people were so weak.

BS: Well that, to multiply, to find a way, firstly, you had people that were not in good health, did not have a good diet, working in a climate that is difficult because heat and humidity takes a toll on the best of people. And so you couldn't expect the output. I think during World War II there were some studies

done on lumberjacks in the West and they were burning on the average of eight thousand to ten thousand calories a day. Well, that's a tremendous energy output for a human being. That's four times what is considered the normal subsistence level. Well, when you expect somebody to do that in a hundred and five degree heat, a hundred percent humidity, on a diet that is lacking and maybe afflicted with a persistent medical problem, that's asking a great deal. My granddad used to have a saying, you put a man in a gas tank and anybody can be a good man. [laughter] And so if you could get these people where you were no longer depending on muscle power and get them on to a tractor seat or get them to point a lever, then you could get a great deal more work out of them. They wouldn't tire as quickly and they wouldn't be taking as many rest periods. So what we were looking for wasn't to necessarily to replace labor per se because the camp costs that you had in the northern areas were not there. Our folks still went home at night. We didn't have to feed them. We didn't have to house them. So what we needed to do was to make certain that whatever machine came on we would be providing an economic multiplier that was adequate to pay for the higher skill required and to recoup the capital in the machine, which made it a much more humble approach than what you had in Canada or they had in Sweden. There was no effort to go to a hundred percent mechanization. It was to mechanize the most onerous task as you went along. The big advantage as we saw today driving around, delimbing here was not the major effort. In spruce, fir, hemlock, about ten percent of your energy goes to cut the tree down. About sixty percent goes to cutting the limbs off it and then about thirty percent cutting it up. Well, we missed that big part in the middle for the most part. And consequently it allowed you to focus on simpler systems because you didn't have that to deal with. The challenge we had was a large number of small stems and one of the things that we had to do, difference between this and the cut to length approach, our trees were small. We had to aggregate them into a unit size that was efficient to handle. And when you're dealing with small stems you start looking at the linear feet per cubic meter of the cord, you soon discover how fast things have to go through a processing head to get any kind of production. By having a feller buncher that could accumulate a bunch of these trees, carry them out of the woods vertically, and put them into a pile for the grapple skidder, it took a tree that weighed maybe two hundred pounds of usable fiber in it, put ten of them together you've got a ton in a bundle and from that point on you can use, it provides efficiencies in handling. And there was many times we were working at things without ever stepping back from it enough to really understand what it was you were attempting to do. It's easy now looking back and say oh yeah, that's why that worked. But at the time when you were in the middle of it you never stepped back and looked at first principle. But we didn't need to reach over rocks, for the most part. You had a fairly level ground. You could drive to most trees with an all wheel drive machine. You could accumulate bunches because since you had it attached to the machine frame you could accumulate a whole lot more on the machine, where with a boom machine you had to swing and pile down and swing and pile down, which was time consuming. And we called them limited area machines. I think the formal name adopted by some engineering unit is swing to bunch or swing to tree. But you were still handling it one at a time and that was a very time consuming process. We had tree shears that had the capability of getting up to twenty trees a minute. The only problem was the darn stuff wouldn't fall down. Rome had one that would get seven trees a minute cutting in a straight line. There was tremendous emphasis on trees per minute because the trees were so small the only way you could get, when you're running twenty trees to a cord or thirty trees to a cord you've got to get a lot of the little boogers to get anything out of it. But what this did because we didn't have that other major cost at the offsite and because most of our jobs were contracted out to private individuals with limited capital resources, you had to focus on devices that were attachments to base machines that had a larger market elsewhere. Farm tractors, bulldozers, front-end loaders, they could go into construction, they could go back to work the plow. They were kind of like the mule. Where when you got a purpose built machine to do just this job if you ran out of that job what the hell do you do with the machine. So our initial emphasis was on attachments. Hydraulics were a tremendous breakthrough because now you had a way to transmit power out from a machine. We had it with steam but a steam driven feller buncher just didn't seem to fit [laughter] into the post Sputnik era of the 1960s. But once we got hydraulic systems that came out of World War II we were in great shape. So we talked a little bit yesterday about the difference in Canada and the U.S. where we came out of the World War II, we called it heavy equipment at the time, now would be industrial equipment with diesel engines, planetary axles, and so forth. We in this era

extended to built on military components while the Swedes didn't have that military manufacturing and so they built on farm tractors and we ended up with a divergence there. The Dowty forwarder in Canada that was largely World War II military scale applied to forestry. John Kurelek and Harvey Boyle and the folks at Koehring took that to the limit with the KFF [Koehring Feller Forwarder] and some of those, the Koehring harvesters. Those were humongous machines. We didn't have the capital to go into that kind of a thing so we settled for the 955 front-end loader, the D4, the D47U, the five-roller tractor and crawler that would carry a shear. In some parts here in those pre herbicide days, in North Carolina you had to take a dozer anyway and run it around the trees. It was called a ringing tractor. So the man with the chainsaw could walk to the tree. See you take a dozer out there and you pack everything down and then you turn a man with a chainsaw loose to cut it down. But if you're going to do that why not put the shear on the tractor, cut it down. You didn't have to fight that brush. Our forests here if you look at them, it's kind of a nasty ugly thing down underneath unless you chase fire through it or your herbicide it. When you contrast them with Canadian forests with your moss over the rocks, and fairly open underneath there, very few things, you got things that sting and fly up your nose but you've got few things that will bite and really disrupt you.

MC: Like snakes.

BS: Like snakes or spiders.

MC: Spiders.

BS: We have the black widow and the brown recluse here and they take up. I got bit a year ago and didn't know what had happened. You know, you didn't feel that you'd been spider bit. I have gotten bit on Saturday or Sunday and Monday morning I woke up and I went to work. I looked at those five steps going up into the building and said I'm not climbing those. I came back home and went to bed and I was out for two days and spent three months with a leg all swelled up from that sucker. I didn't know what had happened to me. By the time I figured out that I'd been spider bit, bitten by a spider, it was too late to do anything with the anti venom. So these are not friendly woods and not friendly for sportsman, for romanticist, or for workers. And thinking just the difficultly of fighting the forest away from the worker was a major improvement.

PM: Do you think that the Battelle Institute reports had much of an affect or consequence on the industry?

BS: I think they did. If nothing else they focused attention and quite often the other thing they did was they released a great deal of creative energy. As far as something being this was a direct result, probably not. But when it was an indirect result, when you look at the indirect results, I gave you those slides of [Tom acres ?] . When you look through those you'll see, I can't guarantee what's in there. I haven't had time to look through all thousand of them or couple of thousand of them myself, but there are, you will see all kinds of things being attempted. J. T. [Thibodeau?] down the Fargo experimenting with fifth wheel forwarders so that you could take a tractor trailer back into the woods. This was a four-wheel drive all terrain machine to pull the trailer out. And there were all sorts of exciting things going on. Everybody had an idea, the cutting torch, welder, hydraulic pump, and a reservoir and they were willing to try things. And there were a lot of really neat ideas came out of it. The logger has always been an innovator. He has to be to survive. And these kinds of things were a way for people to try things. The shears that went on dozers, there were couple of different manufactures of those, White out of Florida, the Meese Brothers to the Roanoke here in North Carolina. Both of those came out of homemade things. It's like this deliminator, the cup I gave you yesterday, the chain flail delimber. It's built by a fellah in Ackerman, a little town we went through this morning. He's a logger. He didn't like what was out there and decided he could do it better. He built them and now he's selling them all over the South. But he's still primarily a logger and there was a lot of that type of thing, knuckle booms, the skidders, Garrett that built the Garrett tree farmer, he was a logger. The Timberjack came out of a woodlands supply organization in

Woodstock, Ontario. Roger Drake that I hope you fellahs get a chance to talk to with Franklin, Roger, Bill, can't think of the fellah's last name, Bill Turner with Union Camp and Ben Baab who was a logger, they got together. Roger was selling Pettibone speed skidders which were knuckle steered. They said hell, we can build a better one. And Roger went to work and Ben Baab and Bill Turner backed them and they came up with the Franklin skidder. So it was an amazing time for creativity. I'd go to the APA meetings in Atlanta at the old Americana Hotel and a fifth of liquor and getting down on the floor pushing things around, these grown men talking about how you could do this, how you could do that. It was really an exciting time. I don't think that would have been turned on without the Battelle report focusing the attention on the problem.

PM: It also seemed to be, you know, the technical skills and knowledge and ingenuity, you know, on local levels able to do this, I'm not sure that some of the stuff could happen today.

BS: There were a couple of things and this is just one of Bill Stewart's half ass theories. But many of the bright young men of that period that were in their forties were World War II vets and when you came out of that World War II experience, you recognized the need for self reliance and to make do and to figure things out. The low book for war didn't apply to World War II. You were constantly inventing and improvising as you went along. Well, when they came back and got into forestry, that can do attitude, that you know, let's do something came through. And the cost of technology at that time was moderate. There was so much military surplus stuff on the market. You could buy hydraulic cylinders and axles and diesel engines fairly reasonable.

PM: And I suppose another thing is that a lot of these guys were exposed to machinery and maintaining it and keeping it up and making do, you know, as a result of World War II.

BS: Making do, maintenance, a lot of old motor pool sergeants and so forth came back. It took the farm boy who was used to following a mule and put him in a seat and given him mechanical skills and machine handling skills and then put them back out on the farm. And so a lot of that, that was new technology then. That was the computer technology of the day and the expansion was tremendous.

MC: But a lot easier for some of them without advanced degrees to innovate with.

BS: Right. It had to be built so that it could be serviced locally, it could be repaired locally, it could be manufactured locally. There was a higher level of industrial equipment, mining equipment and so forth but that was beyond the skills of farm boys. Most everybody who came back from World War II on a farm, used part of their GI to buy a farm tractor. They had a car.

PM: You said that Battelle proposed a second stage of research, which led ultimately to the HRP?

BS: Well, they proposed, they wanted a large grant to take their research and move it forward but the price tag on that was pretty steep.

PM: Do you know what direction they wanted to move it forward, Bill, their particular proposal?

BS: I can't remember that to be honest with you. I think we have it in the...

LG: We have the reports.

BS: We have the reports.

PM: All of them?

LG: Yeah, most of them.

PM: Because I've seen a couple of them but that's all I've ever seen. I wasn't sure where to get others. I mean what I recall is a great emphasis on loading, on pallet systems, and then there was something on aggressive supervision and that's all that I.

LG: We've got, it's been a while since I've looked at them. I don't know if we have all of them. We've got a lot more than anybody else does from what I've been able to put together. I was looking for them yesterday and I think they're in Teresa's office. But we've got a good number of them. I haven't read them in several years. And I think we also have their proposal or a summary of their proposal for the next stage and from what I remember reading a couple of years back they wanted a significant chunk of change to do, I kind of got the feeling that the industry thought they wanted a significant chunk of change to do more of what they just did. We can do it cheaper ourselves, thank you very much. So we'll take a look for them next week too and see what we can do, find and get you copies of them.
BS: One of the things we're intending to do partly out of intellectual curiosity, partly because I recognize I'm approaching the back end of my career, is to try to get as much of the archival documents we've got scanned so that they'll be in available.

PM: This is really, really important as I'm sure you are well aware of because Dale Green had I think two of the reports and that's all he had. He didn't know where any others were and I have the sense that most people don't really know. These are precisely the kinds of things you want to preserve.

BS: I think we've got more than that because this is kind of a melding of the Virginia Tech's archives and Mississippi State's archives so that there's more coming out of it. I know we have some duplicates so we've also got, we'll check and see what kind of a full set we've got.

LG: We have a lot of things that we don't know we kept, in all various moves and melding, I have come across things living in Sweden that I didn't know this existed in the states. It didn't so I copied it in Sweden of all places. So we're trying to put together a list of all the archival stuff that we've got in numerous places, in cubbyholes, and stored around town. We just don't know what we have, kind of like Christmas, when we get to doing that so.

BS: I recently got to going back through some of my files and found articles written by Jack Cantrell of Union Camp on improving the wood supply system in the 1960s. And there was a variety of stuff going on that was independent of Battelle and of HRP at the same time. It's hard to keep up with it all and it keeps emerging out of this milieu that has been my life so it's time to try to get some sense of order of it. But there was just so much going on, so many people trying so many things and we didn't, one of the sad things about wood procurement and harvesting as compared to forestland management, it was a requirement that you kept records of land but procurement has no memories. What you're worried about is what you're going to do tomorrow, not what you did yesterday. And as a consequence, a lot of this stuff was not considered important. There's been a rash of things published in the last twenty years on the steam era but there's been very little on the internal combustion era yet. And I think Drushka's book is an attempt. *Tracks in the Forest* is another one. There have been several that have been coming out but they're largely machine oriented rather than business oriented and social orientations. So that's important but that's only one segment of the things that were going on. But you know we were dealing with an industry that was expanding. We were, this is one of the first adventures in intensively managed forests. It was a flowering, economic flowering, of many in these rural counties because society is pretty well left to time. The closure of society that had taken place at the end of the Reconstruction, World War II just blew the lid off. We had a lot of people coming South, they'd posted at a military post in Georgia in South Carolina or North Carolina, meet a good looking young lady, and after the war they'd come down and live with their newly found wife. We started getting air conditioning. Got malaria under control. Life was not as difficult here as it had been and so all of a sudden you had an intermingling. It happened quicker I would guess in states along the east coast than it did here in Mississippi because there was a more open corridor joining New York with Florida so you had a lot of people moving back and forth. It

was closer to the centers of economic activity, New York, Baltimore. Mississippi here suffered because throughout much of history we were a destination not way for it. Once you hit here you hit the river. Most of the traffic going west went through Memphis and St. Louis. It bypassed Mississippi. The immigrants coming in went up the river. They went up to St. Louis and went to the Great Plains. They didn't come in Natchez and come in here. So a society needs some input, some external stimulus, to get it out of the, economic stimulus and social stimulus to make the change and the wood products industry was one that brought that about because you brought new money in, you brought new people in, you brought new methodologies in. It was tremendous boost for the region.

MC: The industrial revolution in tree harvesting happened remarkably late in historical sense. I mean literally we're talking about what you did and saw done since the 1950s. Why was that section of the economy, I mean since the mills, they were technologically advancing all during this period. Why was tree harvest, the provision of wood, why was it one of the very last large scale parts of the industrial economy to be industrialized?

BS: I think because it was so dispersed. It's easy to industrialize something that has a chain link fence around it, where you can control the environment and you can control the materials. You couldn't do that with tree harvesting. This was an open economic sector. It was not necessarily seasonal but it had developed a seasonal flavor so you, you know. I grew up on a dairy farm. We milked cows three hundred and sixty-five days a year. Therefore, you could invest in a milking machine because you knew you were going to use it twice a day, three hundred and sixty-five days a year. My first investment in a chain saw kept me awake many nights because how am I going to pay for the blooming thing. It was a Canadian built IEL, had a piston about the size of a fifty-cent piece. Had two-speed transmission on the chain. But it was a marvelous tool. But how were you going to pay for it. So that made it difficult. The job could be done with adaptations from other industries, the farm tractor and a truck. Well, what's the sense of developing a specialized tool to replace the farm tractor? That was a difficulty. And finally probably labor cost. The reason industry industrializes is to reduce labor costs. When you had a fairly ready supply of labor, some of which would work for two bottles of Tiger Lilly sweet wine, that's not a whole lot of base to put a major capital investment on. So this was one of these cottage industries that survived well after the cottage had burned for most other people. And it wasn't until we ran out of that supply of labor, until we got on sites that were unworkable by the farm tractor and the truck and where the need got so large it could no longer be met by the forestry equivalent of the old lady and her churn making butter to sell in town. And so that would be my response. There wasn't the external pressure to mechanize or to industrialize the way there was elsewhere.

PM: Okay, perhaps now we can talk about the Harvesting Research Project, which flowed from that proposal that was rejected by the APA.

BS: Yes, it was started in 1967 by the American Pulpwood Association, great deal of input from Ken [Ralston?], who at that time was assistant director to Bill [Bramley ?] . He put together, let's see, there was Owens Illinois, International Paper, Rome Kraft or Georgia Kraft at that time, Container Corporation. There were six companies. I think St. Regis was the sixth. And they put up the money to support HRP. Tom Walbridge was appointed as director. I was hired on as a forest engineer. Joe Blonsky was hired on as a mechanical engineer. Art Bunker as an industrial engineer and Joe Strickland as the forester, with more of a forestry background than an engineering background. And we were assigned or challenged to look at mechanical improvements and managerial improvements to the system. We started of, as I said, one of the early investigations was looking at preparing the short wood system, as it was to mechanized short wood versus mechanized long wood. It was in the first year or so Ken Patterson who was with IP got very concerned about the possibility of unionization of southern pulpwood production. So he pushed through a project of developing, we called it the production table, we didn't want to say work standards, that was under Art Bunker's direction that was looking at trying to establish basic standard times and standard costs for performing all the functions of harvesting. That ended up being a major time consumption problem. I think we spent we had eighteen man years of data that Bobby Lansford worked

with, developing various regression equations. He regressed the hell out of things. Basically what it turned out to be was most of the regression equations, when you look at them, it takes a certain time to do the task and what you get out of the task is a function of tree size. Joe Strickland and I got involved in simulation efforts. What we needed was a way to compare systems so that we were putting them on an equal basis. Well, when you're dealing with something as diverse as forestry how do you cut the same tract of timber twice? There's no way to do it. You have to have some way to simulate what this tract, what machine B would do on a stand A or machine A would do on stand B. So we launched into the harvesting analysis technique, which was a machine simulation program. My interest was in the total system rather than the machine so we pushed that up to a systems level where we started looking at systems interaction. How does machine A and machine B work together. The common approach in forest engineering is balance. You need one feller buncher and two skidders and this and that. The forests here are diverse enough, the markets are diverse enough, that you may need that from two to four on Thursday. From three to five on Monday you need a differ mix. So how do you put together a mix that will give you the elasticity to work together? It kind of flew in the face and still flies in the face of the attitude well, my average production here if you add enough averages together, this is what will come out. Well, every time you add the averages together the averages may be additive but the standard deviations are multiplicative. And what you end up with is an average but it's in a probability density distribution where every outcome has a probability of one. You're no more likely to get the average than you are the minimum or the maximum. It's a difficult idea to get processes that you can't add averages. And this idea of balancing systems, what you needed was a system that could work most efficiently and absorb that variation, deal with that variation, and this is one of the places the tree length system has. With a feller buncher I can pick up one big tree or I can pick up twenty small trees. I still get my ton together. My grapple skidder whereas only probably go into a hundred and ten inch grapple, not what the tree size is, it's what he can handle. Knuckle boom loader, if I've got four light trees I pick them up and put them up one time. If I got one big tree I handle it one at the time. So the system reacted or what you were looking for were things that reacted in a way that they could compensate for some of the major sources of variability and the major source then was tree size and we never did get the weather because that was considered too difficult. But we started looking at how these reactions changed between machines. You know, okay, you start a feller buncher off when you're in close to a landing. You've got excess skidder capacity but you're short on feller bunchers but I have to keep the skidders occupied. So you build small bunches and run the skidders. When you get to the back you've got excess feller bunchers capacities than we do skidder capacities so you build big bunches with the feller bunchers. You sacrifice capacity back and forth across machine types. Where with a cut to length machine if I grab a hold of a six-inch tree, it's going to take me just as long to get it through as it is a nine-inch tree.

PM: Plus the fact you'll probably come to some trees that are too big for it to handle at all.

BS: Exactly, particularly in this kind of a forest.

PM: That's really interesting, Bill, because most people would argue, perhaps us included, Michael, that the most flexible system is the cut to length because it can produce a variety of products. And the most inflexible system is the one that you're saying is the most flexible one. So that's why I find that so interesting.

MC: Flexible around what, dimension?

BS: See if I take these tree lengths and put them in a slasher jack at the sawmill, I can produce whatever product I want. But I only have all that equipment for determining what's in that tree in one location. I can feed that with thirty feller bunchers. But when it's the cut to length you've got to have the computer on every machine out there and you have to keep that computer in good mix or it's going to [*miscalculate?*]. One of my favorite articles was talking about the accuracy of the cut to length system. They cut to the nearest four inches, plus or minus two inches, sixty percent of the time. My question was why wasn't it a hundred percent of the time? [laughter] So the flexibility, our flexibility here, our concern

was the flexibility on the production end. The product recovery end is something, in my opinion, is better done at the factory than it is in the woods. A loggers job is to get them down, get the feathers off them, and get them the hell out of there. Let somebody else play with them. And this idea, now there is the pressure and it comes from finance. As a mill I can produce, push more, of my manufacturing back to the woods. Then I can expense it. If I have to do the merchandizing at the mill then I have to capitalize that. So this is the push back that you're getting constantly and nobody has really settled down and done a thorough economic analysis of what the tradeoffs are. It's whatever is efficient. Right now capital is short in the manufacturing end so they're trying to push as much back in the woods as they can. Now after a while the loggers will quit bearing the cost. They'll say you want me to do what. And then all of a sudden we'll have to capitalize it again. But this is a common swing that's going back and forth. The pendulum right now is to expense everything you possibly can.

PM: So as a result of the simulation that you did then that showed that the tree length system you just described was the preferable one. Is that right? Am I understanding that correctly?
BS: Well, it was one of the things. There was a variety of other things. The tree length system fit in better with our industrial system that we had. The John Deere, well, we could build grapple skidders or build skidders with a Jimmy 353 diesel engine and an Eaton transmission, Rockwell axles, off the shelf items, hydraulic cylinders, very simple, very straightforward, very easy to maintain. At this time this was when the stud mills were coming on. One of the things that people don't consider is the associated industries went through a transformation at the same time. The five foot three inch short wood that we started off with, as the stud mills came online and as the plywood plants came online, then we needed the material brought in a different form and there was a major recognition then that perhaps the best thing to do is bring the whole tree in and then we could pull the product out. You saw that log laying over at PCA today, the one that crawled up out of the pile.

MC: Bent like a pretzel.

BS: Right. Loblolly is a crooked tree. Now most of your cut to length machines are designed for spruce and fir, which is relatively straight. Diameter is the controlling factor there. The ruling factor here with us for lumber recovery is crook and sweep. A set of rollers won't tell you what the crook and sweep is.

MC: Crook and sweep?

BS: A crook is a type fir. Sweep is a long fir. You want to cut the crook out and you want to cut it in a way to minimize the sweep. So even on these computerized machines the crook and sweep is still handled ocularly by the operators. All the computerization is tied to rollers that measure diameter and this is not a species where diameter is that, diameter is important but it's not the primary element that determines lumber recovery of tree.

MC: Now at the time you're doing this would be the late '60s, early '70s?

BS: Right.

MC: One of the things that must have been important was what you were showing us yesterday. Namely, that the size of the area being cut is relatively small and people have got to move their equipment around on a basis that would drive a Canadian contractor mad. And that must push systems in a particular kind of direction.

BS: It did because even though these company ownerships were large, they were trying to bring them into regulation and regulation to a forester means, there are two types of regulation. There's area regulation and there's volume regulation. Under area regulation over the next perpetuity I'm going to be cutting X many acres per year. Under volume regulations for perpetuity I'm going to be taking off so much volume per acre per year. And with the public land survey here, the historic abilities of our logging

systems, many of our company lands were laid out on one-mile squares and then divided up into quarters. So you had, a forty-acre block was a good, workable block. It was deemed large enough. So even though you might own ten thousand acres you were cutting it forty acres at a time. You had to move between each of these forty acres. When you got out on private land you were harvesting ten acres, twenty acres, thirty acres. You might get a hundred or so but for the most part these were small blocks and we didn't have this large scale land clearing that you saw logging in Canada. So we needed systems that could be moved. If you were working company land you could road them from one block to the other. If you were working in private lands sometimes you roaded it, sometimes you'd get a Lowboy and haul it. But it had to be able to be picked up and moved quickly and reestablish and set up quickly. And that's true today. Our fellahs, most of the loggers we deal with work a radius of a hundred miles from their home base and they have to move a feller buncher, two skidders, two loaders, and the associated equipment, sometimes every week, sometimes a couple times a week. Sometimes they'll get a long setup where they might stay two weeks before they have to go somewhere. And some argue that the cut to length system is simpler to move but it moves in total. With these systems I can move the feller buncher, get done with it today, send it out in the morning or take it over there tonight. Tomorrow my feller buncher crew starts working. Then tomorrow I bring the skidders and the next day I bring the loader in so I kind of ooze from one to the other. I never ramp down totally and then move and then ramp back up. It's a transition. And I've watched some of the whole tree chipper operators move a whole tree chipper, three or four skidders, two feller bunchers, and a loader and make the move forty miles and lose three truckloads out of twenty. Now if I did that with a cut to length because I couldn't phase one out while I was phasing the other one in, I'd lose a half a days work. So there are these subtleties that escape when you're watching it operate. You don't understand what's going on around it. And that's another feature of flexibility.

PM: Were there other studies that came out of the Harvesting Research Project?

BS: There were several other things. Joe Blonsky developed a raw shear, which was a shear that pulled the blade through the tree instead of pushed it, which was an interesting development and Rome either developed it simultaneously or picked up the idea and they had a similar shear that could get up to seven trees a minute. We looked a lot at various traction systems. We had a machine set up, built on motor grader chassis that was an articulated tract machine, trying to figure out what we could do with multiple, eight wheel drives instead of four wheel drives. The problem with research is with research you turn a loose. It's kind of like raising a baby eagle. Once you get it up to where it can fly you turn it loose. You never know whether it becomes a monarch of the sky or gets shot down by the farmer next door as one that's stealing chickens. So you have no control over research. We should plant ideas. Some of them fall on shallow ground. Some of them lay dormant for many years and some of them blossom immediately. It's very difficult to attribute this to that. We tried to change the way people think, not necessarily the way they do things. That's management's responsibility. We also did some work on the labor attitudes, labor motivations, the work that Gary Latham did looking at the attitudes of people concerning wood production. Why didn't we keep labor in the woods? What was it that would discourage young people from going to work? What were the dealers' attitudes? And some of that was useful in trying to get people thinking a little bit differently. But managerial styles, how do you motivate labor? that was a mess for foresters to walk into because... [BS requested tape be turned off].

BS: That was not a direct quote. But one of the things that's interesting with forestry is if you look at the history of the profession it's been semi magisterial. The forester in Europe was the gamekeeper. He was the maintainer of the lord's land. When we set up the U.S. Forest Service they became almost a Para-military, green uniforms, badges, campaign hats, puttees. It was very military. Many of the people who came over to the industrial side came out of that or they came out of the military. So they were used to a command and control type environment. When you get out here and you started working people that you're drawing in from society they don't necessarily respond well to command and control. And it was very frustrating for people who were used to saying I want this done as a junior officer in World War II and somebody looking at him saying well, ain't that great, you go do it yourself. And so forestry has

always felt like if we could just get control of this thing we could run it. But it's an uncontrollable situation.

MC: But I mean like industrial engineering is about taking control out of laborers hands, dictating the laborious process, and working them to the point of breaking.

BS: Oh yes, it's pushing everything right to the max. My friend Art Bunker who was the ultimate forest engineer, one of the classic things about Art, and I hope he's still alive. I haven't heard from him for a while. Art was a forest engineer, forest industrial engineer for Union Camp in Savannah. He was given the task to spec out vehicles for the foresters. Being a good industrial engineer he approached it from the standpoint of maximizing economy and efficiency and durability and all those good things an engineer looks for. Well, when he completed his analyses the ultimate vehicle was a Checker Cab because Checker Cab at that time built these power sedans on a light truck frame, had suspension that could withstand New York streets. It was designed for professional drivers and they equipped the foresters with these cabs. Well, the foresters get mad. They drive through a small town and little kid jump out and yell taxi, mister, taxi. [laughter] And these things rode like being towed down to the road on a board. They were hard to steer. They didn't do well off road because they were designed for New York City streets. And they were designed for New York climate so in Georgia in the summertime you could bake biscuits in the damn thing. And Art could never understand why the brake would fail and the car would drift down near the railroad side when it was switching so the train would tear it up. [laughter] But this was the ultimate point of this industrial engineering. Maximize optimatization and the mentality is still there. One of the hardest jobs is trying to get folks to read Goldratt. *The Goal*. The idea is to make money. It is not to be the low cost producer or the most efficient producer. It is to make money. But this mentality of we've got to push and push and push until we're well past point of diminishing returns because we haven't reached that level of efficiency yet. And I'm still struggling with it with the Wood Supplier Research Institute. They want efficiency. This is why we're talking about going double shifting down here. Yeah, I want a logging operation working on that tract over there when I'm trying to sleep at two o'clock in the morning. Be a thirty aught six round through that.

MC: I hadn't even thought about the fact that it is occurring in someone's back yard.

BS: Yeah.

LG: Logging occurs in people's back yards here. You look around. This whole area is somebody else's back yard. Some of it is his back yard. Some of it's the next door neighbors'. There are people a half mile on the other side of that pine stand. It's in their back yard and the people and the houses are so interspersed throughout the woods here, there are very few, three, four thousand blocks with nobody living in them.

MC: Yes, it isn't like working on crown land a hundred and fifty miles from the mill where there isn't another human being in a surrounding hundred-mile circle.

LG: You probably had somebody within a mile. You can hear a diesel engine within a mile.

BS: Or these rural roads, these are not company roads. This road here my wife might be driving it at ten o'clock at night. Now in the daytime she can see down the road and see that this is a log truck coming. It's eight foot six inches wide. It's thirteen feet tall and he's pulling eighty-eight thousand pounds. He's going to have to hit the brakes hard to bring it to a halt. When she sees that coming at her at night, longest thing in the world she expects to find is a highway haul truck on a rural road. So guess what, it's lawyer time and how much do you gain in efficiency if the county supervisors deny you access to that road. How much do you gain in efficiency if the public passes an anti tree cutting ordinance for the county.

MC: Local governments can do that?

BS: Local governments can do that. They can make life hell for you if they want to.

LG: They can decide that there's a low weight bridge. Whether or not there is is immaterial. They can decide there's one and reroute those log trucks so you're adding an extra fifty miles to the trip distance. Well, what does that do to profitability? Forget about efficiency. Profitability is the issue, particularly when you have fuel prices through the roof. And that Bill referred earlier to this social license to practice forestry. Down here that's very critical because forestry happens in the middle of everything, in somebody's back yard, sometimes in their front yard. And that whole community relationship issue is extremely critical when you've got to live with those neighbors every day of the year. You sure don't want to make them mad because somebody wants you to log at night.

MC: If you are the landowner and they are going to literally log your back yard, you don't want them there at night keeping you up.

BS: No.

LG: Or waking your kids up at three in the morning when they fire up the chipper, warm up the chipper.

BS: Now if I'm making money I might be more tolerant. If Miss Sessoms that lives on the other side of the house there is making money and she's keeping me up at night, I'm going to be a whole lot less tolerant. And this is the type of thing that you get into. You have to understand that you're doing this in a social environment and you have to fit in. These contractors, a job manager can manage his business if it's working one shift. If you put a second shift on, the efficiency he gains in equipment may be lost in having to hire a support staff to replace him during that night shift. But these are externalities. What we're really focusing on here is getting optimum efficiency out of this machine.

LG: Well, one of the efficiency issues that's somewhat frowned upon by local residents, we're got few contractors that are working seven day weeks, two shifts a day, seven days a week. Local folks look very suspiciously on that because these people are working when they're supposed to be in church on Sunday. And they're not upset with contractors. They're upset with the firm who is purchasing that wood because they're the ones pushing the concept and Sunday's a day of rest. You are not to work. You can work around your house but you're not really looked on very favorably to work for somebody else.

BS: And it's what are you doing to your people, your workers. This industry is still very tough on the people that work for it. We look at who is, very few of our firms are able to afford any type of health insurance for their employees, very few retirement programs. There may be a disability package but the woods rates are screwed down so tight that there's very little left for employee benefits. Mary's friend Tom works at Wal-Mart in the TLE. His people changing tires have a much better benefit package than anything I've encountered in the forest industry. Now yes, that's efficient, it's keeping our wood costs competitive with those from around the world. But it may be efficient in the short term. Yeah, well the guys go to work in the woods. They really don't want that. Well, that may be true. That may be as much of a function of the type of labor you get, as it is what labor's aspirations are. The ones that ain't going to apply for this job, friend. They're going to go some place else. And what happens is you slowly devolve down to where you're the employer as last resort, which is where logging was for quite a while. And that is not an identity that is favored by economic development groups. You know, nobody wants to bring in an industry that is an employer of last resort. They want to bring in an industry that provides good jobs, consistent jobs, and respectable jobs. And that's a conflict that we're not addressing right now. Part of the thing that has affected the South more than Canada and I think more than Scandinavia is our early harvesting here and much of our early academic work was funded by the Forest Service to look at how do you establish an appropriate price for timber from public land. Well, they saw stumpage as a residual. You take the delivered product price, subtract the transportation, then you subtract the manufacturing,

then you subtract the logging, and what's left is stumpage. That's what you pay the landowner or pay for the land. Well, that is good for a public agency but here we have a traded commodity or you have a corporately owned commodity in the case of company lands or something that you're searching for competitively. So your delivered price is set in the market. Your transportation costs are pretty well restricted by public transportation systems, commercial carriers. Manufacturing costs is fixed by the manufacturing technology. The stumpage price here if it's a corporation I'm going to demonstrate I was making a good rate of return on my timber investment. So I want to keep that up. So the only external group to get squeezed is the logger. And as a consequence we've had great pressure on keeping costs down to try to keep stumpage prices up and to remain competitive. A good friend of mine from Canada that used to be with [Parrish?] said in Canada we use our stumpage to support our people. In the South you abuse your people to support your stumpage prices. And there's a great deal of truth in that and that's one of the things that shaped our attitudes here. First of all, we were dealing with a group of people who were perhaps not the most sophisticated in these short wood producers and even some of our early loggers. Therefore, they were squeezable. And we had a lot of foresters that weren't of the culture in the first go round. They came in from elsewhere and they encountered a population here that was not ignorant, it was uneducated in many of these rural communities. But that made them different. They weren't quite the same as you and me. You know what I mean?

MC: They didn't respect them.

BS: They didn't respect them. And so we had that part of our culture has been perpetuated.

MC: And they think like forest engineers. They think like industrial process engineers.

BS: Yes. I think you've discovered that talking with some of my colleagues. They don't think about the business. It still focuses on the machines and the process performance, the physical performance of the process rather than the economic performance of the process.

MC: Which is, of course, part of their training and what the ideal corporate manager would like them to do.

BS: Well, it's part of their training but I've trained a large number. I got an email from one of our graduates of a couple of years ago saying I'd like to give my loggers a raise but they can't tell me what their fixed or variable costs are. Now I had him in class. I told them there was no fixed and variable cost in logging because fixed and variable is an economic term, it's not a business term. In a day all costs are fixed except fuel. In a year all costs are variable because I can sell the whole damn thing and get into the pizza business. So how is a logger to take an economic term and apply it to a business? He wasn't asking the right questions. His idea was well, you've got this much per day and you know, I'll go back through. Why, because that's simple. Trying to untangle, trying to explain to people how our depreciation system for tax purposes work and why you can say the machine will last ten years and only take off ten percent per year but if I'm making equipment payments I've got to shelter my payment to principle with depreciation or it will be taxed. So I'm going to want to depreciate it in five and I'm going to want to use an accelerated depreciation and that becomes my cost. A lot of these things are proposed now for savings in efficiency in cost reduction. Hell, the tax man's going to eat them up. It makes no sense when you look at what the IRS does. What I have to do as a logger is shelter income, I have to keep depreciation up. I need to keep my equipment turning over because that shelters a certain proportion. I have to maintain my equity. The only way I can maintain my equity is reinvest in my system. The moment I stop pulling equity out of my system the tax man steps in and grabs it. And so they're saying oh, run it longer, you know, it'll cut your costs. It will cut your cost but the tax man will probably take everything that you saved and then some because it's upped your taxable income. What you're doing is trading your equity out. So these things get complex. I can explain it to loggers. I have explained it to a couple thousand of them.

LG: Eighteen hundred.

BS: Eighteen hundred. The foresters in the room will argue with me. The loggers just sit there and shake their head and say yeah, that's right. But, no, that's what we learned in forestry school. That's what Matthew says in this textbook he wrote in 1942. So it's very frustrating. I'm preaching now. It's time to quit. [laughter]

MC: No, no, it's extraordinarily valuable for us to know. We're more ignorant than foresters.

PM: But we know it. [laughter]

BS: But there's a difference between training and dogma and quite often you fall into professional dogmas that have been made obsolete by the way things have changed since, you know, like the pope giving up forbidding people to eat fish on Friday. Well, the trade with the northern European countries for cod in exchange for wine was really no longer a major concern of the Vatican so let the folks eat beef on Friday. We're still holding to meatless Fridays in many ways because it's a simpler solution. Intellectually it's simpler. It ignores complexity. It goes back to these engineering paradigms that have been so deeply ingrained. The problem is that's going back to a manufacturing process when everybody wanted a two-door or four-door Chevrolet with a six cylinder or an eight cylinder engine in it and the greatest variation was how it was painted. That is not dealing with the line down here at Nissan now where every one that comes down the line has a different mix of engines, power trains, power attachments. Our manufacturing technology today is flexible enough to deal with the variation that the customer wants because if it doesn't the customer ain't going to buy it. But we're still stuck in this industry because of, I think a lot of it comes from pulp and paper and lumber manufacturing. Both are commodity systems. When I set up a paper machine to run a certain weight basis paper, I set it up on Tuesday and I run it on that one through midnight Sunday and what I want it to do is spin it three thousand feet per minute that whole period of time. Because who expects much variation in their, you don't want variation in toilet paper. You want it all coming out or hey, this lumber mill that we saw, you've got two by four, two by sixes, and two by eights and we want to set up and squeeze those out just one right after the other. There's no variation in their product. But there's variation in input here. And Nissan, the variation is in the output and it's much easier for an industrial system to be designed to absorb variations in output than it is variations in input.

MC: That's interesting because I think that most people think that wood is wood is wood and trees are trees are trees and that there's something crude about what comes out of the woods on the way to the mill, that it is a uniform product, that it kind of, you know, it's crude, it's raw material. But in fact, it's a natural product so there's all kinds of variations from people who are subject to all kinds of variations and businesses to mills are subject to all kinds of variations. It's a bloody complicated thing.

BS: It is. The system is designed to try to milk as much of that variation out or cope with that variation as we can. You saw the material loaded on those log trucks today. There was nothing similar about any piece in any of those loads. The process from the standing stream to the two by four, two by six, two by eight, or the sheet of paper is one of trying to as efficiently as possible reduce the physical and the work variations involved in producing that consistent product. And that's why sawmills are designed the way they are. I'd love to be able to grow two by fours. It would eliminate a lot of the problem. If we could get all the trees the same size and there was discussion. In annual crops you can breed for that. You know, the old corn, if you go back and deal with corn that farmers had raised in the 1920s, 1930s, the ears were anywhere from a foot above ground to four foot above ground. When we got the cotton picker they bred the height of the ear so that it fell within a range that you could get with a snapping roll. We bred cotton to fit the cotton picker. But how do you do that with a tree that is thirty, forty, fifty years? You try to do it. That was part of the thing with plantations. If we remove the variation in the environment then we'll produce a more uniform crop. You reduce the variability some but you didn't eliminate the variability because we cannot get a plot of forest land as homogenous in production as we can a piece of

agricultural land. First of all, we pick the most uniform land we can for agriculture. Then we put enough fertilizer and lime on it to try to get it up to the uniform stage of fertility and then we've only got one growing season to worry about. Here you've got a land that you can't do all the soil testing on that you'd like to do and you're going to be subject to water levels and all sorts of things over the next three years. So the trees are going to come out heterogeneous.

PM: Perhaps, we can return to HRP, or bring that to an end. Perhaps you could talk about its demise, Bill, and why you think it happened.

BS: Well, there was a couple of things that was going on with HRP. One of the efforts, the seeds of something's demise are generally planted at the time of its creation. It's just like a human being. Your genetic makeup once the sperm hits the egg that sets your genetic makeup and that programs you for the rest of your life. When this was set up several of the companies had logging development groups in house. In several instances the money they'd take to support HRP came out of that logging development group's budget. Therefore, you had people on your advisory board who were upset because you had a portion of their budget and you know that they knew that they could manage their budget better than you were spending the money. And, you know, I want to spend it on this new machine and you want to spend it on labor motivation. So that created a level of consternation.

The second thing was many of those on our advisory group were very mechanically oriented. This was a period of maximum interest in mechanical devices. Well, we recognized early on that getting into mechanical development was a very expensive process, if you look at what Doug Hamilton did with LRA [Logging Research Associates] in Canada. And tried to stay out of that trap. The companies weren't going to put up that kind of money and it really wasn't the type of thing that was appropriate for six companies to take on together. So we had people on our advisory group that wanted us to do that but they didn't want to put the money up to support it. They wanted to do it in house because it was their idea. Some of the things we got a little bit ahead of the time on. The issue of what we were trying to do with assimilation. Hell, that's still complex to try to explain for people to see today. You can imagine what it was thirty years ago. Yeah, well we'll just hammer that out or we'll work them a little harder. You know, don't worry about that variation. We'll iron that out. The emphasis on developing the standard time, standard cost, the unionization threat never did come through so here we had a cure for a problem that never developed. We'd spent eighteen man years collecting information on something that didn't happen. Well, that's hard to explain. It wasn't our decision. And we had no out reach. There was no extension associated with it. If you're going to have research done you need to get that research out to the people who are going to be using it. We were told don't worry about that, the companies will take care of that. Well, the companies didn't and we never were, we didn't push it. But if you get involved in that out reach you soon discover that we have research that is so far ahead of or so far behind the current world that the value is never going to materialize. It takes time to even some simple thoughts out and without that extension arm, without that out reach arm, a great deal of what we did was never appreciated.

Now some of the things that came out of it, the IFO Program at Virginia Tech came out of it. The Forest Engineering Program Auburn came out of that. We put some good people out. The time study people that worked on the production table, many of them ended up in managerial positions because it gave them a leg up. There has been a lot of benefits come out of it but they were not we solved your problem. We couldn't solve your problem. All we could do is give you some insight that you had to use to solve your problem. But people were expecting research to ride in, lower the lance, slay the dragon, capture the maiden and ride off, you know, and that's not the way research works.

MC: And provide that knowledge, expertise that would allow you to control that production process in a way that would make it like it was occurring on a plant floor in Detroit.

BS: Exactly, they wanted it to be able to command and control it and it's like herding cats, you know.

MC: Ross Silversides.

BS: Okay, yeah, in the pre-FERIC [Forest Engineering Research Institute of Canada] days in Canada there were two groups that had developed and that were doing logging research. One was Herb Warner with the Pulp and Paper Research, PPRIC, pulp, paper. [PAPRICAN – Pulp and Paper Research Institute of Canada]

MC: Research Institute of Canada.

BS: Right, and then the Canadian Forester, which created a separate group that was headed by Ross Silversides.

PM: Was that the federal government study?

BS: The federal government, yeah.

PM: I didn't know that.

BS: And I think you've probably encountered Ross Silversides

PM: Yes, we have.

BS: And Ross was heading up a group. He had Monty Newnan working for him who was one of the innovators in logging simulation. He had a staff of about four or five people. And then the industry also created the Logging Research Associates with Doug Hamilton. So you had these three groups. I'm trying to remember where it was we left off with Ross. But part of the thing that Ross was doing was good, fundamental research. I won't call it basic research but it was research into issues that were not of immediate practicality. And as a consequence I don't think that group ever really got the recognition that they had. Now Doug Hamilton with LRA was doing the hard work, putting together the old LRA system of the delimber, slasher, and the LRA feller skidder. And Herb Winer was doing more of the time study type work, the work measurement econometrics work. And the one that got hit the hardest in that because he was not doing what was considered tangible I think was Ross and Monty's group because the Canadian system didn't know how to absorb that. They understood how to absorb machinery and they understood how to take the regression analysis of skidder productivity and when you got an R squared that was only fifty-five percent then you laid off forty-five percent through aggressiveness and kept on trucking without worrying about where it came from. If it wasn't related to what we measured it had to be people and therefore it was problematic. But of the three probably if it had been allowed to continue farther Ross' efforts might have led to a better understanding or fewer missteps. I think there's a need for stepping back from the problem and making certain that the problem that you're solving is really the problem that is real. If you're lucky, you can solve an unreal problem and have a marvelous success because the problem went away while you were searching for the solution. But you run the risk of working on an unreal problem and while you're at work it develops into a real problem and you're worse off. So research into a process like this is so different from research into tree silviculture or any of the other aspects of forestry. And there is really not much respect for research. When I look back at the harvesting research efforts that have gone on in my career, the three in Canada, LIRA in New Zealand, the CSIRO efforts that led to the Windsor harvester, about the only one that's really survived in fine shape has been the SkogForsk, the Swedish system. And that was probably because of the structure of the Swedish industry at the time. Where in the U.S. it was IP against Union Camp, against Georgia Pacific, against Weyerhaeuser, and you had a lot of inner industry competition, which our government fostered. Because we were dealing with an internal economy and what we wanted to do was make certain that our firms were competing with each other to get the advantages of a competitive economic system into our marketplace. The Swedes were competing against the world so it was much easier for SCA and these companies to get together and form what we would call a cartel to deal with fighting the outside. And

because so much of the work in harvesting research has to do with issues that are directly competitive, it's very difficult to find an abstraction where they can share things in common. I know I've struggled with it for thirty-five years of my career and it's a virtual impossibility. It's even very difficult to teach, to try to get people to see that they are part of a larger system when you see yourself as being within this system. The companies are large enough that you become a system and you're a piece of that. You know, you're like a gear in a transmission. Yeah, you're a part. That's the case you're in. Now the transmission may be part of an automobile but you're unaware that you're the, yeah, you pay attention to the industry, but what I'm really concerned about is my part of this system functioning the way it should. Is there a competitive advantage here for us? And the logger is caught on the outside. He may be dealing with three or four of these systems. We have loggers here that this week they'll be delivering to GP. Next week they'll be delivering to IP. They may be moving some loads to Weyerhaeuser while they're shipping this product to IP and he's outside of all the systems. But he is so independent and so dispersed he doesn't have the ability to form a system of his own. Now the Swedes handle that with their Forest Owners Associations for a while where the owners provided a shelter. In Canada you didn't have the contractor system the way we have it now. You might have people contracting within a camp but they were a part of that camp system while they were performing that contract. In Maine you had the Maine Logging Contractors, for example. They were responsibility for the camp but then they may contract with guys with a skidder to cut and skid and they provided that shelter. Ours here operated outside of that. [Wood] Dealer was an attempt at providing some type of a shelter but he had an exploitive edge that he could exercise too and his primary concern was his dealership. The Charlie Donald dealership down there, Charlie Donald's first loyalty is to Charlie Donald's pulpwood. Then it is to the logger who's working for Charlie Donald. So you end up with, in this system, people who are outside so many systems that it's very difficult for us to provide a service for research to get a broad enough application to have it really make a difference. And how you deal with it, I'm still struggling with that because there are opportunities. It's frustrating to see how improvement could be made but it would take cooperation. It takes patience. Too often a good idea is kill the bourn rather than allowed to even reach adolescence where it can do something to defend itself. And you wait ten years, twenty years later, it may come back. We've done several things that I think have been research has played a role in making them successful but they will never be attributed to the research that was the element of its nativity. I did a project eight, nine years ago on lightweight trailers. We put together a trailer that weighed five thousand pounds less than anything else on the market. It works. We still have one running. The first thing that happened when you put it with the companies was they tried to see how they could destroy it. Now here's a five thousand pound savings in tare weight on a vehicle. Had one over here in Louisiana they rammed it in the middle with a loader just to prove that it wouldn't stand up and it had all sorts of trouble. But the fact that we could put a trailer out there that was five thousand pounds lighter, the next thing that happened was some of the other trailer manufacturers started cutting a thousand pounds here and a thousand pounds there. Okay, my trailer was a failure. There's only one that's still running. You know I don't like that but the fact that that change brought about other people to change their thinking and to make their changes in trailer weight. And since been there's been three thousand, four thousand pounds shaved off other trailers. Okay, will be get any credit for it? Hell no. I don't really care. We did something.

The worker's comp insurance, we did one of the most complete analyses of the worker's comp program here in the U.S. Dave Wilson who's now with Davis Garvin did the work. Pointed out weakness in the system. Well, yeah, everybody knew those were there and they set out to solve them. Well, they solved them. Workers comp rates got under control. Will that research ever be cited as the cause? No, but we made enough noise we got other people to look at it. And so this is why I'm somewhat pessimistic about research but at the same time I'm sanguine that this is not a field because you've got to change people, not change things. So the linkage between outcomes from HRP and the work was done is very difficult to say. But when you look at some of the things that were done, the original thinking, the original discussion started with HRP, the same thing with the IFO effort. And you know, if you spend your career, you change two or three things, that's better than most folks. You can take pleasure in it.

MC: I commented to Peter, I said no one's going to come interviewing us to see what we did. [Laughter]

BS: Well, this is the first time it's happened to me so you don't know yet.

LG: Well, other than when Ken got you.

BS: Yeah, Ken Drushka.

LG: We also commented yesterday how does this compute in a university promotion and tenure system. You're interviewing here. We're now a subject of research. Yeah, and how does that compute? One of the other things that struck me when you were talking is we might want to talk a little bit about exactly what a contractor is down here.

BS: Let's follow up with one last thought though on this issue of research and why it's hard to claim credit. As Laura said, we've talked to eighteen hundred logging contractors. Now some of the things that we cover in those for a small contractors, are basic issues. Get a will. I talk about dying intestate and tell them that's nothing to do with castration. That has to do with having to go through probate. Get an umbrella insurance policy, a personal liability policy. They had some very fundamental things. Okay, I spend an evening on these issues. We can tell where we've been because the insurance folks know where we've been because the next day they get calls about umbrella policies. We've had CPAs coming to set through the session because they only get half the story. But we tell people to go see a CPA and they've come and set through to try to understand what we're saying. We've had insurance people come in. It's a product of our research. It is not something that is significant at the .05 level and is in a refereed journal. But we've taken it out of the work we're doing. We take it out, we present it to the people. We hopefully change things. Maybe I've saved a business or two by providing some insight. That, you know, beaches were built one grain of sand at a time, and so this kind of thing makes you feel good. You think maybe you've done something and it's worth doing. I enjoy the people but I enjoy the fact that they'll come up and thank you afterwards.

MC: Well, I think I know how to take academic credit for what we're doing because we're having a seminar. [Laughter] You know, Canadian folks, sociologists, studying industrialization of tree harvesting have come to talk with you and we've been sharing ideas and everything else. We can call it a mini seminar and, you know, we can include it in our annual report. Certainly it will be in ours. [Laughter]

BS: Well, a year ago, well it's nearly two years ago now, came up with an idea that let's hold a round table for loggers. Now you've got to remember, we're two people at a, not one of the most highly regarded universities in the South but a reasonable university. We issued an invitation to loggers associations in seven southern states. Just come at your own expense. We'll buy your lunch. But lets get together and talk. Well, out of the seven we invited we had thirty people from five different associations. Some drove in from Savannah just to spend a day with us talking and sharing ideas and getting stimulated. And their response when we went out was, we'll see you next year. Well, we did it again this year we added another state or two. And this is nothing formal. We throw a bunch of crap out from our research. It's not presented in a refereed journal article. But one of the guys going back talking about using wood yards as staging areas, maybe it's time to return to that. He said I've got my idea that paid for my trip. He said I'm going back to talk to my company and instead of waiting my trucks in line, I'm only five miles from the mill, I'm going to fill my yard and they can tell me when to bring my truck in. He said that's going to save me all kinds of money. Well, okay, again it's not refereed. It's real. [Laughter]

MC: Write it up and put it in the refereed journal or a conference paper.

LG: Well, that's one of our challenges is many times these real things are very difficult to get published because they don't fit the theory. It's real. It works. But it doesn't fit the theory. It's not supposed to

work. In a small field, which my being somewhat younger makes me slightly more cynical, in a small field very often the last thing anybody wants is to rock the boat and if you have something that's different, it's not going to get through the refereeing process.

MC: Literally we submitted an article to the Canadian Sociology and Anthropology Association and one of the reviewers said well, you've explained the industry but what has this got to do with clear theory. It is a particular area of sociological research that we obviously thought was where serious work was to be done, you know. And we were extremely frustrated. We helped explain the world. Isn't that what we're supposed to do. The part of the world that we were trying to explain was of no interest to this person.

LG: Because it didn't fit his theory.

MC: Yes.

LG: And we run into that a fair amount. I would rather help that one there make a change. Somebody else got another idea from that last roundtable that is enhancing his revenue stream. Well, he enhances his revenue stream. He gets profitable. In our system you only pay taxes when you're profitable. He's profitable. He pays taxes. I might get a raise that way. You know if nobody's paying taxes there's no state money. So is it more important to get it referred or get that idea out there in a timely fashion and maybe save that business or those other families that are dependent on that business. And that's one of the challenges you run into in this area. You know the whole refereeing process we know takes a while. By the time you do the study, write it up, get it through the refereeing process, it's three years, two to three years. We've got problems. This idea might save a business tomorrow so then you've got to work [to establish?] those types of issues out too.

MC: And you have an unusual mandate as a university I suppose to help the community.

BS: Right.

LG: Yeah, the role of the land grant university is quite different. We do have that mandate to reach out and provide those services to everybody in the state. It's that "service role" but it's more than the traditional service role most people think of. It's actually getting out and trying to make a difference or be a change agent, get people to think a little bit different. The health problems that we talked about earlier in the woods were solved by, well here, a couple of ladies who had a good idea how to improve the diet. They were going around, extension agents going around, and that was a start of a snowball effect. You start getting a few people to change. They tell somebody. They tell somebody. And pretty soon you've got an exponential effect.

BS: It was a grand thing, preaching the benefits of black strap molasses because black strap molasses contain enough niacin that if you use black strap molasses instead of sorghum, you would get the niacin that would keep you from having pellagra. Now that was not the Salk vaccine that was a result of extended laboratory tests. This was two home demonstration agents, that saw a problem, knew of a solution, and evangelical women.

MC: Isn't that called value for money or big bang for little bucks?

BS: I think it is.

LG: And in the 50s that was a major part of the role. Now in the more modern era we all struggle with these things. But that wasn't a refereed article so therefore that doesn't as what the university should be doing.

BS: This refereeing used to bother me and it still bothers me but I have reached a philosophical understanding that everywhere else in life the role of the referee is to make certain that everybody plays fair, that nobody steps out of the boundaries of the defined playing field and that the score was really a legitimate score. So what is happening with the refereeing process in many fields, the referees have defined the playing field and unless you play within the field and unless you recognize that there's only one way to score then there is no controversy. A referee is to remove controversy. But change is made by controversy.

MC: So it's a problem for scholars who are supposed to be pitching ideas and making new thoughts.

BS: Right. The refereeing process can be a very slow, defying process. The thinking is that they're assuring quality but how do you define quality. What is quality? Is a proper lab procedure, followed by a proper statistical procedure on a problem that is only hypothetical? Or is a somewhat sloppy data collection procedure because you can't reproduce this experiment that leads to a mixed quantitative qualitative understanding but it helps understand the problem and helps the individual who is trying to solve that problem, gives him a way to approach it that's different. Which one is more valuable? It's troubling. We have folks who have turned out wads of marvelous papers that had absolutely no long-term value because the problem they solved went away or solved itself or was too complex to be solved by the simple structure of their analysis. But it's led to refereed articles in journals of esteem that probably three other people in the world read and only two can comprehend what was said. [Laughter]

MC: And one of them is wrong.

BS: But that's the point there is how do you measure what you've done. We gave you the pages of the articles in the publications and so forth but one of my most effective ones produced a little two pager. Frank Harrison asking what's a rut worth because we had all this anti rutting argument. I went through and looked at what not making a rut cost and looked at what it cost the logger, the company, and the loggers' crew to be shut down for a day so they didn't make a rut, and then looked at what the value of the timber if he did reduce the growth on the stand, what the value of the timber in thirty years would have to be to cover the capitalized costs of what was lost. If you reduced it ten percent, it grossed ten percent. Stumpage on hardwood, hardwood pulpwood, which was say five bucks a ton, would have to be fifty-six dollars and seventy-five cents. If you sterilized, you know, we also gave a cost to that. So I throw this out as random thoughts. Two years later I got a Xerox copy. A fellah said have you seen this. It had been copied so many times that everything had disappeared. Some of the words had been written in by hand. It came back to me after that many copies. Well, you know, every place it stopped along the way somebody had taken...

MC: An opportunity to think.

BS: An opportunity to think and that's what the idea was. If I got him thinking then he's going to change something. He may not like my solution. That doesn't matter but at least he's got his head up out of the rut. [Laughter] And you know what a rut is. It's a grave with both ends kicked out. [Laughter] Okay, I'm sorry. Where were we going next?

LG: I was suggesting talk a little about the actual what an independent contractor is down here, you know, the small family business. And you were hitting on some of it with delivering to eight or ten markets, never knowing really who your customers might be. That may be a little bit of a different structure and a different business pattern that's worth discussing.

BS: We have independent contractors and then we also have captive contractors. It depends upon which way you're looking at it. Some of the companies refer to captive contractors as preferred suppliers but they are largely committed to a firm. Whether or not their independence will truly withstand the twenty tests for independence is very questionable because the major things there are method, manner, and

means and when you get to working with many of these captive contractors somebody else is controlling method, manner, and means. Order and sequence is another one. But these captive contractors may be independent businessmen but they are still largely captive to a market or to a firm with whom they contract.

Now an independent contractor, one who meets all of the legal requirements, he may work for several firms and he may work under several different configurations. He may buy some of his own stumpage. He may work through a dealer on some of the stumpage. And he may work directly with a company on some of the stumpage. But he is independent. He has the right to choose which of these various configurations he's going to take on. We end up with both on the private stumpage, the dealer stumpage and to a certain extent on [partner?] stumpage, that he may be working for one but he may be delivering to two or three other entities. For example, that tops and pulpwood you saw mixed in, we don't know whether the butt logs from those tops went to the same mill, the same company, that the small timber and the tops were going to. I suspect that may have gone to one company. The tops are going to another company. So it's not the case as you may have on some of your limits, where once a contractor gets in there, he may have a contract but that contract may last for a harvesting season and everything he produces goes through one gate. Here we have some folks making seven to twelve sorts on a tract.

LG: Going to seven to twelve different companies from a same tract. Their contract length may be anything from that day that they're just delivering what we call gate wood, which is when it shows up at the gate it's bought. They don't have a long-term contract. If the mill doesn't need wood they close the gates, very simple. Or a long contract down here is typically however long it takes to harvest that one tract. As you saw from some of those graphs yesterday, that might be three days and you don't know how long your contract is. So that makes it's interesting managing a business with the bank wanting to get paid, banks have that tendency, labor wanting to get paid, their wives have that tendency, and not to mention everybody else to whom you owe money. And your contract might be three days and you don't know if you're going to get another one. So it's a very risky system.

BS: It's a high risk but low margin system.

MC: You've got the definition of a nightmare.

BS: Right, it is.

MC: Well, the question I have is who gains from such a situation of uncertainty and low margin and why don't they try to change it?

BS: There's been kind of a gentleman's agreement that, I'll try to keep my language nice here, that I'll take advantage of you on Monday, Tuesday, and Wednesday. Then you can take advantage of me Wednesday afternoon, Thursday, and Friday. And the point of it being is nobody really benefits. If there's any beneficiary that has come out of this it's been the landowner because again, the procurement organization is feeding a mill that has a set cost for manufacturing that's determined by their technology. They're going into a transportation system in a market. From that point on the system is pretty well set. The hope is that this tumult will result in low procurement and logging costs. But if it does lower it any that goes into the stumpage and the stumpage values go up. And so by having the two groups fighting each other they leave each other at a disadvantage. You know, when have you seen a fight that both the winner and the loser didn't come out of it weakened? And that's the situation but it's kind of like an argument between a husband and your wife. You may have started this argument twenty years ago. Neither of you know how to get out of it. But every time the opportunity comes up you get right back in it. And until we take a look at how this system functions, our transactional costs, both financial, social, and human, there's no way we can come out of it. There's all kind of efforts but generally those efforts are about one group trying to get the other group to change, without setting down and saying okay, we've enjoyed this just about as long as we can. You know, let's make a major change here and start all

over. I'm tired of this fight. But there are short-term efficiencies that are associated with long-term costs and generally what it is, is just trying to pass costs back and forth, transferring cost from one to the other.

PM: From what you said, Bill, it sounds like the greatest amount of elasticity is in the wood procurement system and the rest of the costs are pretty fixed. So if savings have to be made, if there's a recession that has to be weathered or whatever, that's the segment that has to bear the brunt.

BS: That is traditionally the segment that was [staged?]. The last five years there's been something interesting happen. There was a piece of folklore that if a mill ever had to close down because of lack of wood the wood manager and the procurement staff would be fired instantaneously. Now the industry has discovered that we can shut mills now. There's a point at which we shut mills down rather than paying this high cost for wood. And they have shut mills down. And that is sending a message, not certain it's the right message, but it's another degree of freedom that was not there philosophically ten years ago. Now that's one thing. Nobody likes to shut a mill down because that also has a helluva impact on the local community. It may not affect the corporation's bottom line but it sure does affect the bottom line of everybody who is pulling a salary out of that system. But it may be better to shut it down for a short time than it is to close it permanently.

…certain that the other systems are as straightforward as you may have been led to believe because these systems have to be adapted. Every tract is different. So the way I did it on this tract may not be the way I do it on this tract. And working relationships, people, machinery may change. I might leave this skidder home because I don't need it on this tract. Or I may bring in a different feller buncher or I may park a loader or I may add a loader. But we know the process, the flow, but every time we go out there it may be structured slightly different.

Let's go back to the bobtail truck. The bobtail truck was an outgrowth of the crew work, a work gang, and it manifested itself in several ways. One manifestation and it's still a fairly common one, you'd have three men and a truck, an Igloo cooler, and a chainsaw. They'd go to the woods. One man would take the saw and cut down trees and limb them and buck them up to length. If he was an older man or somebody of reduced physical capacity, that would be all he did. If he was, in many crews that would change because that was the least demanding for physical work. It was demanding but it wasn't as demanding as a lot of it. There would be another man that would be associated, or a tumbler, or another two guys who would tumble the wood. They'd take the bottom butt, roll it up, tumble it end over end til it got close to the truck. Then when it got to the truck two of them would get under it and boost it up. And one man might still be cutting down trees. Then when they got tired of lifting, the crew would rotate amongst them. When they got the whole truck loaded or particularly when they were loading the top they'd tumble it up and wait til all three got there. So you might have two men pushing it up over their heads and the third man up on top to hook a roll like I've got hanging out there, pulpwood hook hanging out on the wall, to grab it and pull it up the rest of the way. Then when the truck would get loaded, everybody would go to town together. They'd all go to the wood yard. Before we had the mechanized wood yards they had to because they had to unload the truck, take the wood off the truck then and put it on the railcar, so three men to load it and three men to unload it. Then we got the mechanized yards where you had a swing loader to pick that load up off and put it onto the truck.

Now another version of this same system, if they happen to be a wealthy crew they'd have a mule. So one man would be cutting the wood down and limbing it and then another one with a mule was skidding it out pole length to the truck road. There might be a third man there cutting it up. And then when they got a load skidded out and cut up they'd all three quit and the mule would take a break and they'd go ahead and load the truck by hand. And many of those systems or that configuration then one man after mechanized wood yards, one man would take the truck to the mill or to the wood yard while the other two guys would stay out there. The other two guys and the mule would stay in the woods. They might or might not rotate out the jobs. But it was work rotation. You'd do one thing til you got tired, then you

would take a break by doing something else. And the only one that never really got to change out was the mule. He was stuck doing what he was doing. When you had a big stick, generally what you would do is the tumbling crew would load what they could by hand and instead of getting everybody out there you would use the big stick to take the bigger pieces up to the top of the load. And in those many instances again, then you'd leave a residual crew in the woods to start preparing the second load. And that was basically the structure. You tried to get the truck as close to the stump as you could. You preferred to have the trees felled before the truck got there so they didn't drop the tree on the truck.

MC: That would not be fun.

BS: No. That would not be fun.

PM: Practical experience speaking.

BS: Right. But in the high labor input periods, job rotation was fairly common. When I was cutting saw logs, running a chainsaw in saw timber was fairly rigorous work because the saw weighed forty-five pounds. But when the truck came back and it was time to load then you were asked to go out and work with the loading crew because all you were doing was set talk and that gave you a break from that. You know, you got together. Part of the thing too was the social aspects of it. You would get together once in a while to talk or to kid one another and you had some human contact then you'd go back to these jobs, which were hard and noisy and communication wasn't very common. And at one time when you were working gangs and it wasn't as loud quite often there was a lot of work chanting going on and interaction that way. When I did my master's work I was working with a logger outside Durham that was cutting trees down, cutting the log lengths at the stump and then a horse was skidding them out. And then he had an arch behind the farm tractor that he'd take them out to be loaded. Well, one of the things that I have kicked my tail for ever since, I didn't think of it at the time, but the old fellah that was working the horse, the horse worked by voice command and it was an old black man and he chanted to the horse. The only words that I could understand were "trouble on my mind." But he could take that horse and steer it through an S curve just with a chant. But it was this singsong chant that went on all day. It was a marvelous thing. But I was too young and too green to appreciate what I was hearing. I'd love to have those chants on tape. But that was basically the way these bobtail crews worked. The older man might own the truck then he would try to avoid the heavy lifting. That was a status. And then he'd get a couple of hands. When they'd get there generally the pay would be on a share of the load basis. One share for each man and one share for the truck or two shares for the truck and one for everybody else and, you know, you'd count it out. Then these wood yards got paid per load. We had one mill in Virginia that every time you delivered a load of wood they'd cut you a check because that was a way to assure people that they were getting their money's worth. It was an outgrowth of rural job cooperation. They were used to working that way in the fields so they just took the same system to the woods.

PM: There were a couple of changes. You spoke of the big stick loader. Then I think there was also the Loggers Dream.

BS: The Loggers Dream, yeah. The big stick, both of them were built down here in Mississippi. Tom Walbridge was the advocate of the big stick loader. He was from out west. He loved cable. Cable started down here, we went west, they made it sophisticated then it came back into a very fundamental form. T. Z. Brown in Louisville was building those. They were a very simple winch built out of an old truck deferential and a brake drum. But it gave a way with a simple boom hanging over the load, it gave a way to lift those big sticks up on top. The Loggers Dream was also built in Louisville by Taylor, Bill Taylor and Taylor Machine Works. And Taylor started off building agricultural equipment. He had [Pasture?] Green and a variety of other things. He has since grown into an industrial equipment manufacturer. But the Loggers Dream came out I think during World War II. Prior to that the way you loaded logs was you either, on most of these small jobs you cross-hauled or you rolled them up. Cross hauling was where you tied a rope off to the front and rear bolster on the truck, ran it through under the load until you had a

loop, and then you hooked the other end of the loop to a horse and the horse walking away from the truck on the far side caused the log to roll up on the truck. And that was slow. Many times you loaded with [handles?]. You had a pit and you'll still hear the landing here called the Pit where you dug a pit and backed the truck in so that it was near ground level and you rolled the logs on. And then you put skids up to ramps, couple log ramps, that you rolled the logs up on those to get them up higher on the truck. Well, that was a laborious process and it was dangerous, particularly when you were rolling them up there with a peavey. As long as you had control of the log it was okay but if a logger ever got hold of that peavey he was going to get hurt. So the Loggers Dream was a very simple, generally a two-drum winch with a very simple boom attached to it that had one line hanging down. Now you could rig it so that it would be a high lead skidder. You could take it out and put a rehaul line on it and it would allow you to skid short distances. But it was most efficient as a loader. You had one man operating the winch, one man on the ground setting the tongs or the end grabs, and one man positioning the log on top of the truck and putting it down into place. Also, the same configuration is often called a jammer. Out west they used jammers. And oh, there were all sorts of things tried for loading here. One of the most efficient ones of the pre-hydraulic era was the 22B, the 15B [? series] drag line, which was a small, half yard I think, drag line, little [buck?]. And you put a grapple on it, a Max grapple. Max is one of the major manufacturers of cable operated grapples. And that had the ability to position the grapple over the log, grab it and swing it up. You still had, it eliminated the deck man but you still had to have the top man to get it in the position to unload it. And I've seen some guys using those that were fantastic. Ken Babb who was a logger in Virginia had a loader operator who could grab a bundle of pulpwood with that thing, swing it, would swing up on end, either slap the grapple, hit the ground, even the butts, take the grapple and catch it and put it on the truck. He was a magician with it. Jim Huff who was forest engineer development manager with Albemarle Paper Company came down this country somewhere and got on a swamp job where the guy was taking a 22B and swinging it because it was a dragline you could rotate, and he would throw those [200 comps?]. Jim said he could throw them a hundred fifty, two hundred feet and grab a log. And Jim was talking to the boss and he said you can't do that. The owner of the job said, don't tell him. [Laughter] But this was an adaptation of a piece of excavating equipment for the woods and it eliminated one man. But these systems, one of the greatest places where people got hurt was loading. A lot of legs broken and a lot of backs broken falling off a load, a lot of fingers lost. You learned very quick how to get your fingers out of the way. As I said, I grew up in a community that was farming and logging and it struck me when I went to HRP. I was sitting around a table and there was ten other people sitting around the table besides myself and I looked, everybody had their hands out. It struck me that was the first time in my life I'd ever looked at people's hands and everybody had all their fingers, all their joints. I grew up, you're always missing something you know, an end to one. And those things went very quickly. Now once we quit using chains and so forth, it's very seldom somebody. You still shake hands with a lot of loggers though and there's a joint missing here and there you know.

LG: Particularly the gentlemen in their seventies and eighties and yes, they're still active logging. It has changed enough that they can keep working to that age. But the older gentlemen in particular, although many of them when I've talked with them, you know, it's an old trick. They lost their finger in a saw milling accident, not so much logging.

BS: Logging and in saw milling the fingers lost, it was just a sign of how things have changed. Now if somebody's missing a joint you notice it. Back then it was common.

MC: My father-in-law who ran chainsaws since he was ten, kicked back.

BS: Right. Well, there were some other things tried to in that period. We had the bicycle saws, which were a marvelous, dangerous device. The Briggs and Stratton motor mounted on a set of bicycle wheels looked like a garden cultivator with a horizontal blade. Every time I see one of these ads on television for this Troy Built brush cleaner, it scares the hell out of me. I started one of those things on the landing and the blade grabbed the root and took off. You're setting up on a pile of logs watching this thing with this

twenty-four inch blade running around the landing ricocheting off of things, waiting for it to run out of gas. [Laughter]

PM: It didn't have any kind of clutch system on it? Once it was going the saw was?

BS: Once the engine started the saw was running.

PM: Felled and bucked with it?

BS: You felled and bucked with it. It was better at bucking than it was at felling because pushing that thing around through the woods was okay in the slash pine region after you burned it. But in this stuff out here it was too hard to push.

MC: And of course they wouldn't turn it off, push it manually to the next tree, start it again?

BS: No because most of the time the way you started it was it had a V belt and you snuck up behind it and grabbed the V belt, pulled the V belt, you lost the pull cord back on the job before last. [Laughter]

PM: Delimbing would be with an ax?

BS: With an ax. You could delimb, well, with pulpwood. Now when you got into saw timber and the limbs got up four inches or in hardwood, you delimbed with a chainsaw.

PM: All right.

BS: But those old saws were hard to swing around. There were processes, the Swedish process of the ballet with the chainsaw of how to get all the limbs off. But the southern pine here is a multi-notable species so your limbs don't grow in patterns where you can do those kinds of things. But many of these systems, and again, they were also highly adaptable. One of the things a good manager often tried to do was rotate the crew so that nobody got too tired. You know, tired folks get hurt so you were trying to make sure. Not only that but you also had to keep everybody cross trained so if somebody stayed out that day you might work eight people to have six or nine to have six. So it was important that everybody knew how to do what everybody else was doing so whoever showed up that day you could put a crew together from them.

PM: Right. In terms of further change of that short wood system, I guess it would be the attempt to fully mechanize it with the Bush combine.

BS: Yeah, the Bush combine was an attempt to fully mechanize it. There were several other machines that they attempted. The [Ciero?] harvester was another attempt. That was mounted on a drop excavator. There was a felling head to drop the tree, pull it through a delimber, and cut it off. There was a variety of different systems. I don't know if Tom Walbridge talked to you about the Jesus machine or not.

PM: I vaguely recall that but I don't quite remember what it was.

BS: After they finished building the C5A, the big military transport plane in Atlanta, Lockheed engineers, some of the hydraulic engineers that worked for Lockheed were at a loss for things to do. They belonged to a church and they talked the church into the idea that the way to make money for the church was to finance their experimentation with this marvelous pulpwood harvesting machine. So they took two *Bobcats* and on one they put a steel plate in the front with a sheer and a couple of rollers and a [three ninth?] delimber. And then they had another one that was going to have a basket. Well, the idea was that you'd run up on it, put four thousand TSI hydraulics on it, aircraft scales. The idea was you'd run up

and cut the tree. You'd cut the tree back so that the butt was pointing up and then you'd fire the rollers up and they'd pull it through the delimber and this knife would come by and cut it off. Well, they got the cutting part working good and they got the rollers working good but they never got the knife working good. So sometimes it would cut it, tip it back, and then when you'd hit those rollers it would bring that whole stem up to speed and kind of fire it like a large spear going top first out through the woods. Well, it got the nickname the Jesus machine, first of all because of the funding, and the second was when you were walking through the woods you'd see a six inch diameter pulpwood tree going out through the woods twenty feet off the ground and you're like Jesus! [Laughter]

The most marvelous of those was the Probst harvester. And the Probst brothers were sugar beet farmers out of Colorado that worked for Herman Miller who was a design company that built, you may hear of their offices. They were very sophisticated office complex, office designers. They also had a system, robotic trays for hospitals back in the sixties and early seventies where you had magnetic strips you could put into the hospital floor and the little cart would follow it. And you put it on the blue line and it would go to this floor and you put it on the red line and it would go to some place else. They came up with this idea for a pulpwood harvester and they talked Container Corporation, Brunswick, and I think it may have been Kimberly Clark put money in it. But it had a very sophisticated shear on it that you drove into the tree and if the power of the machine was enough to drive the shear through the tree, the machine kept moving. If not, they would draw a hydraulic and cut the tree off. Then they ran it up into a carousel, which rotated a hundred and eighty degrees and while you were cutting the next tree, this tree was bend downwards by a pair of pressure rollers through a delimbing knife and through a pair of pincher shears that would pinch and cut it off into five foot three inch lengths and store a stack of this wood vertically on the machine, very much like an old fashioned corn binder. When your accumulator pocket got full then it would go blip and spit them out sideways. This was built on a large Tiger four-wheel drive farm tractor basis. And it was an early effort at computer control and when it ran it was a marvelous thing. It could get down a row and it'd take six or seven trees a minute, cut them, delimb them, and produce five foot three inch wood lying on the ground. But when it malfunctioned it was a nightmare. And at malfunction you would cut trees very quickly for a short period of time then that computer system would get screwed up and you'd have to go back and reestablish everything. So it was computerized but it really wasn't in the context that we think of computerization now. It was probably more of a transistorized switching system than a true logic system. It was a sequential computerization rather than a logic system. But that was probably the most sophisticated of the efforts of producing five foot three inch. There were other, we tried some of the Canadian machines. I'm trying to think, I've got pictures of them in the office, attempted the same approach. Cut the tree down, put it back on a…

MC: Koehring short wood harvester?

BS: Yeah, the Koehring short wood harvester but this was a simpler one. It was built, I can't think of the name of it right now, NESCO [Northern Engineering and Supply Company].

MC: They built a Slashmobile.

BS: Yeah, this was a piece of in-woods equipment that slashed. Yeah, NESCO built the Slashmobile. Like I say, I've got pictures of these things but thirty years ago it's hard to think of the makes and model numbers. This cut it off, leaned it back on to a shoot, cut off a stick and then kicked it out sideways and processed the tree in that fashion. But the [Ciero?] got some serious trials down here as did the [Probst?] and there were several other less formal systems attempted. It soon became obvious that cutting the stick to length in the woods was not anywhere near as efficient as bringing the whole thing out and either slashing it en mass. The Currie Cost Cutter, I'm certain you've heard of that machine. That was a solution here for short wood. Bring it out on a truck, load it, take it under the Currie. Cut a whole truckload at a time. It's hard to beat those kinds of economics. And the Currie was a good patch between the short wood and the long wood, the tree length system.

PM: Right, which is what I'd like to talk about next, is the appearance of tree length systems.

PM: In the beginning there were separate systems for producing short wood pulpwood and long wood for saw logs?

BS: Well, yeah, let me back up. The common system when I first came south is much of this area you had three different passes going through a patch of woods. The first people who went in were poles, the piling people. They took the best, the straightest and best material, took it out, essentially tree length, and they went through. Then the next group that came through were the loggers and they took out everything that was twelve inches or over and quite often they would bring it out in log lengths too. Then the third group that went through were the lap wooders or the top wooders and they were the pulpwooders that went back in and took everything from that twelve inch to ten inch top diameter down and made it into short wood pulpwood and brought it out with trucks. So that was the normal process. The difficulty with bringing out even the saw timber tree length was the loading because you didn't have a way to process it at the mill and the saw logger was generally moving larger volumes and lesser value material. Poles and pilings demanded a premium. So I could load a pole truck to where it got offered a load and even if I only had half a load on it I could afford to drive it. I couldn't do that with saw timber. So the loaders of the time often required the saw logs to be reduced either in the woods or at the landing. Now if you could skid them out tree length with a small dozer or with a farm tractor it was simpler to buck them at the landing and handle those other pieces from the stump up. The lap wooder had to go through and sort out, find everything that had the stick of pulpwood in it and get it out. Now with the advent of the chip 'n saw where you were going from a mill that accepted only log length to a mill that was specializing in small diameter material and had a slasher attached to the front, then you could bring material in tree length and they would cut out whatever the log length material was, put that through their stud mill, and the tops were generally chipped and you had enough clean chips coming out of the stud mill you could hide the amount of bark in the top.

PM: So you've got one system producing both products, so to speak?

BS: Right. And then the pulpwooding focused on stands that were thinned or harvested only for pulpwood. They didn't have any value as chip 'n saw. But the chip 'n saw and peelers for veneer demanded such a premium that you tried to get everything out of them that you could. Now most stands not all the trees went through chip 'n saw so you produced pulpwood too. And this is where the Currie Cost Cutter came in. You could use the same system that was producing the tree length material for chip 'n saw to produce pulpwood and then take that pulpwood to the mill and run it under the Currie and slash it up or there were other slashers. There was a variety of other slashers out there. But Jim Huff and Charlie Williams were two that really pushed the Currie. And Jim was one of my mentors at North Carolina and I still remember Jim at one of the APA meetings in Atlanta that had to deal with slashers and slasher technology. And at this time we had the NESCO down. IP had the NESCO down. They had the Tanguay down. Weyerhaeuser had an elaborate slasher deck of :Beaucoups?] of circular saws sticking up through a platform with chain conveyors going by. And Jim gets up and gives his discussion about the Currie and he said I predict that this slasher will not be successful in the South. He said it has three inherent disadvantages. We all know that anything to be successful has to be expensive. It has to be loud. And it has to be troublesome. He said the difficulty with the Currie is it's cheap, it's quiet, and it works. He said, therefore, it will never be successful. [Laughter] He said because it works there's nothing for the engineers to worry about, you know. But it did work and it provided a way to make that transition between the tree length and the five foot three inch wood. And it was supplemented or displaced really by the chip mill because when you had a chip mill set up so you could bring pulpwood in tree length and chip it directly in tree length form, then there was no need to go through the slashing process. And by that time many of the pulp mills were getting enough of their furnish in sawmill residue chips that there was not an interest in building a new wood yard. And one of the things that happens with any industrial facility is you may have built it way out in the country but unless you bought a lot of acreage around it, the town will close in on it. So you end up with mills like North Charleston in Charleston, South Carolina

that after a while it got prohibitive to be taking tree length material on those city streets and they went to a series of chip mills outside so they could chip it and bring it in box lengths.

Now you'll have a lot of pictures of the Fargo chip mill on those discs I gave you from Tom Baker because Tom was the one that put together the first chip mill. He was doing that while others were putting in slasher yards and that mill ran, became the prototype for the chip mills that WestVaco put in, that St. Regis put in down here to feed the Monticello mill, and those terrible chip mills that spread across the South that got all the environmentalists so terribly upset. But what that was, was essentially taking the cost of the wood room out of the mill, putting it out into a remote facility where you could operate it. You'd operate lighter equipment because you weren't dealing with union labor. The maintenance cost, you could afford to maintain a small drum and a small chipper outside the mill because the overhead associated with that were much less than dealing with mill maintenance.

PM: Could you say a few words about the kinds of harvesting systems that first produced these tree lengths?

BS: Okay.

PM: I mean I take it this is where the Roanoke shear was first introduced.

BS: Yeah, there was an effort, and again, Tom Bush had a hand in it, of trying to produce tree length material and there was a system called the Montague mill. I don't know if you've encountered the Montague mill. The Montague mill was a circle saw slasher that went into the woods. And essentially what it did, it consisted of a feed table that had a winch mounted above it and a saw with a five foot three inch stock and then a chain conveyor to go up onto the truck. And you would bring in tree length material to the Montague mill and drop it. At that time much of the cutting was done by men with chainsaws, and the skidding was done by small crawlers, the D2, the D4s, with an arch on them. And you'd bring a tree length to the landing. Then you would drop to where you could get a set of tongs on it with this winch on the processor and it would pull it up from down there and then start feeding it through this mill, cut off a five foot stick, and it would drop onto the conveyor and go up on the truck. And those were fairly common down here in the '50s and the early '60s. I think I've got, I don't know whether there are any pictures on those slides but I've got slides of them in my collection that we didn't get to.

So we had a system developed using crawlers and arches or farm tractors and archers to bring tree length material out, particularly in areas where the brush was particularly problematic. To get in with a short wood truck you needed a pretty good drain. You needed reasonable drain and when you had brush over a man's head, you could lose, we lost a lot of tree length material in there. So we had this system of getting a tree length to roadside. The difficulty we had was getting it loaded and getting it reduced to five foot three inch lengths to go to the mill. The major breakthrough there was a shear because getting a man out into that with a chainsaw to drop the trees was a problem. And so when we first came out with the Roanoke shears, those heavy shears, the directional felling shears that mounted on the front of the dozer, that was a major breakthrough because you had a way to get it down now. And that was the most dangerous part. It was the most strenuous part and also very dangerous dropping trees. And so the shear came first. The next step was trying to adapt the grapple skidder. The first grapple skidder I ever saw came as part of the Beloit system. Bob Larson designed that where you had the Beloit H14 that laid it down and then you had the grapple skidder come in. Well, we had folks who tried the grapple skidder without the H14 and that proved to be fairly successful.

PM: How did the bunch get built?

BS: Well, there wasn't a bunch built in the first step because generally where that system was used the trees were big enough, you only had to pick up two or three. So you would pick one up, drop it, pick up two, then drop it and then pick up the third one. You didn't get the full advantage of it. But the tree

shear made a tremendous difference. There were some other work went on. Max [Rigoni?] tried a 955 that he had the tree shear off mounted to one side of a frame on the forks of a loader. And his effort was to cut the tree and throw it over and then pick it up in the forks and carry that tree crosswise til he got to the next tree. And there were various attempts at horizontal bunching behind that to put loads together. There were also attempts at various bunching machines to go in and pull these together so that your skidder when it came in could get a full load. None of those really got that far but there was attempts going out there with a farm tractor, a mule, whatever. But it wasn't til we got the shears that could carry the trees vertically that the feller buncher really came into its own. Now HRP played a role I think in that with the Allen shear. Joe Blonsky, Tom Walbridge, and I were sitting in a coffee shop with Andy Allen of Allen Hydraulics out of Savannah, the son of S. A. Allen who was a big dealer for Union Camp. And Tom drew one on a napkin and Andy went back and built it and put it on a Bobcat. Tom had done some work with a Timberline shear off the Bush combine on a Bobcat and he liked the idea of the Bobcat as a small machine. And the Allen shear was one of the first ones down here that could carry a tree out vertically, which is a real advantage for us because it allows you to get in, turn around, and lay material down and to build a bunch.

PM: So you do it for each tree?

BS: You do it for each tree.

PM: Cut the tree, back up, put it down?

BS: Put down, right. And that went on for about four or five years and then there was the addition of the accumulator, of having the ability to accumulate multiple trees. Those were of two types. One was the grasp and finger type where you held it with some grapples and the other ones pulled out and came around and grabbed it and packed it in. The Rome shear used an open U where you drove it into the tree and it backed the tree in. That was one of the reasons for their front closing shear was you had a plate to carry it on. But once you got the feller buncher to the point where you could either take one big tree, two medium size trees, or four small trees, then that made all the difference in the world. And now you could control the size of the bunch you were putting together with the feller buncher. So the feller buncher's responsibility became building the bunch to work on. And before that your skidder production was always fluctuating because of the size of the bunch or the skidder was losing time by trying to stop and pick up two or three bunches. So with this system you had a feller buncher, which was a basic machine, nothing sophisticated, forward, backward, with a shear that had very few controls on, that could build a bunch. A skidder, again, very basic machine, somebody who could drive a car or a farm tractor was very comfortable on it, skidding it out to the landing. The most sophisticated, the most difficult machine to operate was the knuckle boom loader to load that onto a tree length truck. Because the loader you're working at a remote tool and it takes a different level of skill. But you didn't have to have an engineering degree to operate any of this equipment, or to maintain it because it was fairly straightforward. Those machines at the time were generally an assembly of parts on a purpose built frame. You bought a Detroit diesel engine. You designed a frame to hold a three cylinder or four cylinder 353. You put a clutch belt housing on it and generally an Eaton transmission with a power divider on it, transfer case that had one PTO shaft and two drive shafts, one for the front differential and one for the rear differential. And all you had to do is put a frame around it, put the protective structure around it, and put the decals on and you had a skidder. We had twenty-seven manufacturers of skidders in the United States at one time because everybody could build them. They were fundamental but they fit our capital requirement needs.

Then the next step up was some of the manufacturers like John Deere and CAT got into it. Deere had an advantage because they were developing some, well those long line manufacturers as opposed to short line manufacturers, because they were developing more sophisticated transmission, torque converters, power shift transmissions for agricultural equipment. The axles that they were using were ag based axles. Had marvelous debates about the advantage of inboard versus outboard differentials. John Deere was the first and then the audacity to take the differential in and put it inboard. They came out of differentials

for the planetary and then you had a large axle going to the wheel, where everybody else came out of the differential with a small axle and had the planetary in the wheel. Got many a good drink over that one. We went from the clutch and straight shift transmissions to power shifts, which made a difference because one of the disadvantages with the standard manual transmission, at low speed you didn't have the machine momentum to carry you through a shift. So it was very difficult to shift up and shift down. With a power shift transmission the torque converter and the clutches allow you a continuous application of power and you didn't get stuck nearly as often. And then things kept getting more and more sophisticated and now we're up to hydrostatic systems, which are marvelous but they're a whole lot more complex and a whole lot more expensive and a lot more difficult to maintain.

PM: I think I'm finished, are you? I mean maybe in more ways than one.

MC: I'm so tired I can't come up with any ideas at the moment. I'm burned quite crisp.

LG: Well, we've got, this probably doesn't need to be on tape. What we can do is take a break. [Tape turned off and back on.]

PM: Bill, you mentioned that you knew of Bruce McColl of, it wouldn't be FERIC. Then it would be the woodlands section or division of the Canadian Pulp and Paper Association.

BS: Yeah, when I got to know Bruce and work with him I think he'd retired from woodlands section and he was working as a private consultant. He was under contract I believe it was Owens Illinois to work on advanced harvesting machines. I've still got the blueprints of one that we worked on with Bruce and [assimulation?], which was a marvelous machine. It was a machine that picked up a forty-foot chip trailer, stored it on the back, had two booms out front to feed a horizontal mounted chipper behind the cab. So this thing would go through the woods and grab a tree and shove it down strip hauler and do that on a repetitive basis, throwing the chips into the van and then you would take the van out to the woods and off load it and it would be sitting there ready to move. Bruce was a very imaginative and creative engineer. But he was a thorough, working with him you knew that you would come up against a very high skilled engineer because he presented papers with the K factors for learning curves on operators and there was no question that you could ask about that machine or it's projected performance that Bruce couldn't answer. And working with the fellah was a real pleasure. He was a genuine gentleman. He is, I think he's still alive or was the last I heard. He was a genuine gentleman. So I think he worked on the original Dowty forwarder and had led the charge on much of that early Canadian mechanization. And if my memory serves me correct, he was an aircraft engineer, aeronautical engineer during World War II and then took that technology across into the pulp and paper industry. But two engineers up there have always stuck in my mind, Bruce McColl and John Kurelek.

PM: Right, if I remember correctly, Bruce McColl was hired by the woodlands section in something like 1947 or '48, somewhere around there. I forgotten the title of his position and I've forgotten the name of the person that he was immediately under. I should know but I have forgotten and he did a number of things that I discovered at the library there. One of the things is he wrote a conceptual paper on the advantages and disadvantages between continuous processing kinds of systems versus systems that are broken into steps, in distinct steps, which was really, really interesting. And I think he was most closely involved with the Bonnard Prehauler, which was the machine that created and led to the Dowty forwarder.

BS: Right, the Dowty forwarder, right.

PM: So we know of him.

BS: Okay. But Bruce was very active in developing conceptual machines. I don't know of his involvement in, because at this time he was a consulting engineer so he was very quiet about things that he was

doing. The other one that was very creative was Bob Larson, the man behind the Beloit and Bob had several other machines out too. And Bob was an interesting character because he lived hard. [Laughter] I think Bob's dead. I've lost track of him. After a while you get separated from these people and you lose track of them. But Bob's work on that and the [Larson?] harvester, they were advanced work for the time. And the fact that he was able to generate the money to take them into the, well, in the case of the H14 Beloit through commercialization, that was no small undertaking.

PM: I mean that was an early machine. It was a tree length harvester. It was the first one that we're aware of and is the most successful one that was used in New Brunswick by Consolidated Bathurst for a good number of years. In fact, that reminds me, one thing I will, after the skidders came into fairly common usage, at least in Canada, there was a drive to develop tree length harvesters, you know, to produce for the skidder, which and as far as we know there doesn't seem to have been the counterpart down here.

BS: No, there wasn't because as we said this morning the limbs weren't the problem and that is really the difference. I know Timberjack had the tree length harvester.

MC: The RW30.

BS: Well, no, they had one before that.

MC: Did they? I didn't know that.

BS: Yeah they had, I've got pictures of it. I worked with it I think it was in a prototype stage. I don't know that it had a numerical designation. But there was that pressure. John Deere had their X10, which was a tree length processor, harvester processor, and there were several others. But the basic difference here was we could get away with a feller buncher and a gate delimber and we didn't need to go to that delimbing stage.

MC: Because apart from Beloit, they weren't very successful because the other one that was in use in Canada was the CAT 950 and that was not very much appreciated, at least by operators anyway.

BS: No, that was, the 950 was the one that laid it down and kind of ran it back beside the machine. That was, it was tried down here as was the John Deere X10 but the need was not here. It would have been useful in Virginia pine and some of our soft hardwoods but we were so, the Gate, again, was a good southern fit, cheap, easy to fix, simple to operate, easy to move, and was never really considered a success elsewhere because it was too cheap, too simple, and too quiet. [Laughter] But no, I was trying to think of some of the other innovators. I don't know what happened to the [Ciero?] machine and where it went to.

MC: Rudy Vit was prominent.

BS: Rudy Vit, yeah, Rudy is one who deserves a great deal of credit because Rudy's feller buncher was really one of the first that was an accumulating feller buncher. It was mounted on a Bonbardier Muskeg and flipped the tree back over the top into a sling that closed. And Joe Blonsky brought one down here and used it and experimented with it on WestVaco's land. And it got people excited about the idea of using feller bunchers. The real question was how to accumulate. We went through several manifestations. Franklin had Little Feller, which was a shear machine that dropped the trees into a sloped carrier along the side of it and they experimented with several different types of machines as well. The Little Feller I think Union Camp supported the production of that. And there were several of them out but it never really got, it was used as a thinning machine, as a row thinning machine. The Rome harvester with Sam Cochran, that was another. There were a lot of those sold. It fit well on a small front-end loader and could be used in thinning. It was good because it could make good time going down the rows.

It was a continuous process machine. You ran it into the tree. If it didn't have power to drive through the tree the shear shifted back and declutched the carrier, threw all the hydraulics to the shear, a shear knife came by sheared it off, as soon as we shear it off the head moved forward, the power returned so the operator wasn't constantly starting and stopping. That was handled mechanically.

BS: The thing that makes this difficult is after forty-some years with this, just about the time you think you understand the system, you don't because something has changed or something that you hadn't considered before manifests itself as a significant influence. And it's kind of like, well, herding cats is a good example or hauling frogs to market on a flatbed truck. Just about the time you get a load, something jumps off. And it's very difficult for me to talk with you and think about all the ramifications and manifestations. If I say something that is this way, it's difficult to avoid and saying yes, but that is the way it worked here, there, and elsewhere because of this, that, and the other thing. The one thing we were talking about before the break was the impact of interstate highways. The South had been penalized, it's my understanding and again, it's one of these things I haven't had time to do the full research on, but coming out of the reconstruction era the old interstate commerce commission put penalties on finished goods moving from the south, north by rail. And consequently transportation or the additional cost of transportation has been a problem for major finished goods coming from the south. Fortunately, the reconstruction era republicans had not imagined the semi truck, so after World War II and the development of improved U.S. highways and later the interstate highway system, the south now had access to northern markets that was different than water, which was slow, or rail, which was expensive. Prior to that time the primary means of distribution of goods, not only in the South but in a lot of rural America, was by local railroad. Every small town had a railroad station and anything you wanted shipped had to be picked up and deposited. And therefore, it wasn't that difficult to have wood yards built in these small areas and to have our cars just put on a siding. And there were enough trains going by they could pick it up and move the wood with a reasonable amount of efficiency. As the interstate system expanded, more and more goods moved by truck just because of speed and flexibility, the rail traffic dropped off. The railroads then started concentrating on bulk hauls, moving coal from Appalachia to the coast or what they were looking for was transporting automobiles because you could leave GM's plant in Atlanta with twenty cars of automobiles and move them to Knoxville or wherever without all the intermediate stops. So the local rail traffic dropped off but what that left were many of these small wood yards scattered out in small towns. They lost their efficiency because it was difficult to get trains to switch, the number of switches per day dropped off, and also you lost a lot of the one-line hauls. So what this did was start to put pressure on the wood supply system to go from concentration yards to direct haul from the woods to the mill. And that put additional pressure on for going to systems that provided full, seventy-three thousand pounds, eighty thousand pounds, or in Mississippi now eighty-four and Alabama eighty-eight thousand pound loads. And what we ended up with, where before there had been a certain degree of flexibility in the system by going from the woods to the wood yard, now when you loaded a truck it made the haul the whole way to the mill. And that put additional pressure on the system to move away from the short wood to long wood or tree length trucking.

There were some intermediate things attempted. There was multiple stick length. Some mills went twenty-one foot, which was four five foot three inch bolts. It was a compromise. It gave you an easier piece size to handle but it reduced the size of the slasher you had to have at the wood yard. So here again, this being an important economic sector, but not an economic sector large enough to command performance out of the railroads. We ended up modifying our system to satisfy a change that was brought on by a larger piece of economic development. Wood still constitutes here in Mississippi, now I think over fifty percent of our rail traffic is associated with the wood products industry. We have the numbers. I think they may be in that handout we gave you. In this state right now, one out of four trucks on the road, twenty-five percent of the total tonnage of material handled by commercial trucks is wood in the rough. One out of four trucks on the road is log truck. But we're still an invisible industry. We are so common that people do not notice.

MC: Well, I mean, it is amazing in fact, in spite of the fact that, for example, New Brunswick forestry is still the largest industry, I think the largest industry in Canada, huge here, it does not seem to impact upon people just how big it is and how important the industry is. I mean how much of the road traffic, I mean New Brunswick, Holy Lord, every time you turn around what you see is hauling wood, right? Why is it that the industry is invisible?

BS: I think there's a couple of things. One is we fall into an uncomfortable national accounting niche. Agriculture considers us agriculture when it's important to count the contribution as agriculture. But if we get in the way of interfering with crop or cattle funding, then we are no longer agriculture. Manufacturing considers us important when it is time to look at jobs and manufacturing income. But we are on the periphery so when it's not convenient then we become agriculture. But they consider us agriculture, agriculture doesn't and as a consequence people vanish. Laura has done the work here with the Mississippi Loggers Ed program. We have met three thousand firms that are dependent on the wood supply system in the state. But the numbers that the state Economic Development Authority, the Mississippi Development Authority, they count eighty-six.

MC: Eighty-six firms?

LG: Eighty-six firms. And some of those really aren't loggers, they're wood manufacturing firms. The federate fit count five hundred funds and we found over three thousand.

MC: Is there some definition of firm that they're using to exclude most?
LG: Nobody's really sure why. Part of it is it's been a very informal network of these contractors scattered around throughout everywhere. One of the ways they claim they do a census of manufacturers, logging traditionally was considered the first step in saw milling. The government never has even claimed to do much with firms smaller than, with fewer than forty employees. So far out of those three thousand firms in Mississippi we have, well, one firm that has more than forty employees. Ninety percent of the firms have four or fewer employees so we're not only talking small business we're talking microscopic businesses. They fall off the radar screen. Okay, so I miss one of these four-man businesses, nobody worries too much about it. But when you miss several thousand of them it starts to add up but nobody's measured the size. If you don't know they're out there, you don't know what you're missing and that's been one of our big issues, big problems. We estimate there are thirty thousand people employed in the woods, which is more than any single segment of the wood products industry. The government measures four thousand. That's just a slight difference, little tiny one.

BS: See we're running in to many of these firms organized as sole proprietorships, therefore, when they turned their, go to the income tax, and they'll turn their job in as logger or pulpwooder. There's no way to distinguish who is working on a logging firm, a skidder operator, from the owner of the firm. You go to the state corporation commission there is no way to pull the numbers. These are micro firms. We have hundreds of one-truck owner operator contract truckers in the state that are hauling wood products. Well, when they turn it in, it's trucker. They don't report that they're owner of a trucking firm. They're a trucker. And so part of this invisibility is our own fault, that is their own fault. For a long time I don't think anybody wanted people to know the size of the industry because that might attract attention from the regulators and the last thing in the world you needed was more attention from the regulators. We'd had enough problems with the pressures in the '60s and the '70s for collecting withholding, the effort to make all these small independent contractors employees of the firm to simplify the collection of income tax withholdings, social security, and Medicare payments. So we wanted to try to keep this distance and not let the numbers be known. But you start doing some arithmetic of the amount of wood consumed and the production per firm, you soon recognize that there is either a lot of wood appearing by magic or there is a whole lot more people out there than is recognized. Trucking is Mississippi is an interesting example. Under the state law with a harvest permit you can haul eighty-four thousand pounds on a log truck. Well, the state highways maximum limit without the permit is eighty thousand. The harvest permit is good on state and federal roads but it's not good on the interstates. So log trucks here don't roll on the

interstate. They avoid it. In sections of the state we have federal highways paralleling the interstate, going in, going for example, from Wynonna to Grenada. You won't see a log truck on the interstate. But you get over on, what is that, 62 or 61, it runs from Wynonna to Duck Hill up to Grenada.

LG: Fifty-one.

BS: Fifty-one, that's covered up with log trucks. Well, where do you set up the tallying system for measuring tuck traffic? Everybody knows all the trucks are on the interstate. They don't run these routes. Well, we do and again we disappear. As a consequence, then when it comes time to look at economic contribution and so forth, you're off the radar screen.

MC: Well, there's something funny that goes on in eastern Canada where fishery for academic is big time. It's a major area of concern, yet they have very little concern for forestry. The system is very few people who study it. It's almost as if it's not sexy for a reason that we've never quite been able to put our fingers on. But it simply isn't, people don't warm it for a reason that simply I don't understand.

LG: I think partly this invisibility problem with the fisheries industry, who does that? You're talking about people. You're talking about small family businesses. There is a face on that industry. With forestry, the foresters tend to talk about the trees. They don't put the human face on foresters. They don't talk about the economic opportunities. We have a sawmill close down in a small town in Mississippi and within six months the gas stations in that town are gone and so is the grocery store because that hidden engine that was driving that local economy, even though everybody thinks it's agriculture, agriculture peaks. You get money during harvest season. You're not paying your bills during planting season. You've got to sell the crop first. Forestry is something that goes on year round. People don't, forestry has not done a good job humanizing what it is we do. For many foresters many of the students we tend to attract they're much more comfortable hugging the trees, either with a feller buncher or any other way. They got into forestry very often because they like to go hunting and fishing. They very typically did not get into forestry because they enjoyed working with people. And I think that may be part of the issue as well, is traditionally the type of individuals we attract. It's interesting being outside. The idea of getting up in front of a group of people or working with a group of people is not what attracted them to the profession to begin with.

BS: I think there's a lot to that and then when we get a student in who likes to work with people, because we see ourselves as a quasi scientific or quasi engineering program, we tend to force so many technical courses on them and judge their performance, their technical performance, not their interpersonal skills, that those who have those skills leave because why do you want to put up with this. The other thing about it and I think Laura touched on an important point there. Fisheries, the family farm, down here shrimppers, they talk about people. When we talk about people, the only people we've ever really talked about is the landowner. The forest landowners receive 6.2 billon dollars from their timber in 19--. Well, there should be a caveat. Mississippi loggers produced ten billion dollars worth of economic activity because of what they contributed. Now the mills will get reported. Wood manufacturing jobs, you know, amounted to this much in the payrolls reported. Some how there's wood grows on the tree then disappears magically and appears at the entrance gate to the manufacturing plant and nobody considers what goes on in between. And that's why I say we're the invisible industry. We have billions of dollars invested in skidders and cutters and trucks. We know it's there but it doesn't get recognized. It is not considered sexy. There was a period in the '30s and '40s where logging, particularly out west, had a romantic nature to it. But at the advent of the environmental movement in the '60s and the '70s it became a despoiler of landscapes and villainous and nobody wants to associate themselves. You know, the meat packers don't talk about being butchers. You don't hear Oscar Meyer talking about the fact we killed six million hogs to make this bologna this month. So you don't pay those who run the slaughterhouses. You tend to talk about the clean parts of it and from a standpoint of a forest, what we're doing we consider an important economic contribution to the local, state, regional, and national economy. But from the public's viewpoint, we're butchers. Not only are we butchers we have to do our

butchering out in front of me, God, and the rest of the country. We can't load the cattle onto a truck and take it to a slaughterhouse and have it done quietly inside a tin building. We have to do it right out here in the open. And if we leave a mess, that's a mess that everybody sees. So it's very disturbing for the loggers because they see themselves as important key, an important contributor to the economy but then not to receive the same attention the farmer. When he cuts his crop everybody knows there's going to be another crop there next year. There will be a crop there within their purview. But we cut a tract of timber, it's very difficult for the public to believe, even though they've seen these tracts come back. In ten, twenty years it's greened up again as wildlife habitat virtually from the time we load the skidders out of there. But we've never done a good job at explaining that. The money in forestry has been in criticizing logging in forestry research rather than in supporting forestry research, trying to find ways to do a more benign, socially and environmentally benign job, without having to pay for that more benign activity. We've taken on a great deal here with the Clean Water Act. The logging rates now are less than they were before we had to take on all of these responsibilities of SFI [Sustainable Forest Initiatives]. I was looking at some stuff ten years old, the rates then and the rates now unadjusted for inflation. I mean in actual dollars, today are about the same as they were ten years ago. Some instances they're the same as they were twenty years ago. Now how do you absorb the additional social responsibility, the additional environmental responsibility and keep your costs at that level. It's been a tremendous burden and I think those who have stayed have done a tremendous job to just survive. But you're right. There is no one who really considered the loggers. This is a three-legged stool. We have the landowners who have an investment in the land. The loggers are a stake holder because they've invested money and energy and intellect, and you have the mill. And those are the three legs that support a forest based economy. But the one leg is disregarded and the other two attract all the attention.

PM: It is very hard to convince people that they should pay attention. I mean we find it very frustrating to be writing about this and we have to search out *Technology and Society* to find a venue that's interested in discussing what happened and why, not journals that would jump at the chance to write have an article published about an innovative automotive factory in wherever.

BS: One of the criticisms here of the lumber industry in the West was that it was technologically obsolete. It was a nineteenth century type industry. And people who make that statement haven't gone into a sawmill and seen the number of computers involved in setting head rigs and setting edgers on the trim saw. You walk through one and it is as automated as any of the manufacturing plants. You look at today's equipment with the level of sophistication there is there in hydrostatic control and computerized ignition systems and so forth, it is a technologically advanced method of doing what was granted, a nineteenth century job. We're doing the same thing my great grandfather did. We cut them down, we get the feathers off, and we get them the hell out of there. But we're doing it in a much different, much more sophisticated fashion.

MC: There's a lot of hype, and b.s. really, around the notion that somehow an increase in services economy or information economy has somehow made all the other things that people eat and that people, you know, physically need and everything that goes into that to be somehow old, obsolete, and of no real concern anymore.

BS: Well, this is one of the things that hit the industry hard here in the late '90s, the dot com boom, because that was taking so much equity out of manufacturing industries and putting it over into the services and the high tech industries. You look at the run-up of Amazon's stock or all the companies that went belly up and it made it hard for those fundamental businesses, the fundamental industries that are producing things that are only passing import like toilet paper, very difficult to find political and economic support in the government or in the marketplace. But what happens, well we'll just get it from China. Well, we might not. The process here of not just using our intellect but using our intellect and our resources to produce economic activity is much more critical and we have to guard it cautiously.

LG: But where is it we need to start?

BS: South.

LG: Well, what I was talking about was this, you know, we were talking about the dot com cycle and speculation and that appears to have happened in the forestry industry. Well, this is not the first time it's happened in the forest industry. This cycle of building value in a product and then speculation is something build it up, build it up, it reaches a critical point and then it slides back and when it crashes it goes back to a more primitive stage than where it crashed and then you have to start building up the next one. We've seen quite a few of these cycles in forestry throughout the South and probably in other reasons. We've just kind of focused on the South.

BS: And it's not at all uncommon in industry to find one technology reaching the limit and then if we are fortunate there's another technology can come in and use the same resource in a different way. This is what we were talking about out of the southern kraft industry coming in underneath the sawmill industry. But what happened in the sawmill industry, as they reached in to that cycle, speculation that money was to be made that attracted people's attention, more money came in, more speculation. You got less sophisticated investors and more speculation. While land and timber prices got run up, there was nothing left to put new technology into the mills so we were using these aging mills to try to process material to maintain marketplace. The only way to do that was to push as much production as you could through the mill and other supplies were opening up. The Doug fir was starting to come in and the lodge pole coming in from the West displacing markets in the plains. All of a sudden, we had marvelous prices, no wood, worn out mills and that whole system started to collapse. Now it didn't go bang and disappear overnight. Many of these mills went bankrupt in place. People talk about the cut out and get out. They didn't get out. They went out. They just went into a bankruptcy period. Instead of having these marvelously complex mills that were cutting a half a million feet a day we went back to a ground mill, a small portable mill that was cutting fifteen thousand feet a day that was fed by a mule and you brought the wood out to a planing mill. Then the system shifted away from the sawmilling to where the industrial development was in the planing mills and the dry kilns and that came through. By the 1960s the pulp and paper industry had emerged to where they were looking to the slabs from the sawmills. These old ground mills you used to take them, run them out, and set fire to them, burn them. The bigger mills had a teepee burner. That was the best fiber we had. There's a great deal of energy went into debarking slabs. Then some folks came up with the idea like Hosmer and [Nubs Moray?], why debark the slabs. Why not debark the tree, the log and then you can chip the slabs. Well, that took an entire different mill setup. That took electricity and the mills were no longer portable. We had truck systems we could bring the logs to the mill. And so we got off into fixed location mills again where they were chip 'n saws or sawmills and that industry has climbed back up now to where our lumber production in the late '90s was just getting back to where it was in the 1920s. And this is a cycle. Now what we keep hoping is as one portion of the cycle reaches maturity you have a new technology coming in that will replace it. It may be producing the same product. It may be producing a different product. But if it makes good use of our resources and our people, and provides economic activity that justifies it to the communities and to the state and to the region, then we're doing well. I'm certain that in 1915 the sawmillers weren't thinking about the end of the cycle. Some of them were but they had no vision of what the next product, kraft paper. You know, you're not going to be cutting one by twelve's anymore. You're going to be producing paper bags. Who me, you know. So yes, it's easy to get pessimistic but if you think through your pessimism it's easy to become optimistic again. Maybe this next industry will start off where it is not so…

BS: For me down here looking back over things that have happened, when I first got into the business the Northeast, the various small mills in Maine, New Hampshire, New York State, and the lake states, all those small mills in Michigan, they were very, very profitable, very productive. Many of them now have closed. Much of that has shifted. The demand for newsprint has shifted down here. With the TMP process we were competitive. When they've closed, the cycle has not fully completed yet because there's been nothing coming in to replace them but I think there will be. We're seeing more grade hardwood production coming back in up there. What it's going to be down here, that's our challenge, more

research, we should be ten years ahead of where everybody else is. We should be thinking out there and looking out there and getting things prepared but unfortunately it's very difficult. And this was one of the problems with HRP. We were ahead of the game and when you're way out front you make a convenient target. When you're way out front it's very difficult. Well, support me. I'll be important in ten years. Yeah, well Son, I've got to survive tomorrow so let's cut that budget and let's get over here and work on something that is relatively mundane but safe. Research shouldn't be safe. Research should be risk taking. We're buffered by society at the university. We are the ones who should be willing to take the risks and most faculty are. Administrators are very nervous about risk. But if we're not taking risks then we're no longer fulfilling an appropriate function for ourselves in society. The industry that's here now does not particularly care to be questioned because they've got their hands full with aggressive critics. Why pay attention to constructive critics? They're so busy fighting off the Huns, they forget about the fellah that comes up and say chief, are you sure that you want all your archeries on that battlement when they're coming from over here. Out of my way, Son, I'm busy fighting these guys. And that's one of the challenges, how do you be a constructive critic without being a pain in the ass.

MC: Sometimes I think you have to be a pain in the ass to get any attention.

MC: But one of the things about these cycles is that, you know, the quality of the resort is progressively degraded. In New Brunswick we used to have trees six foot through and that was the size of the board that you developed out of the center. Now if our trees are six inches across or nine inches across, it's good. There's no doubt that as the quality of the resources become progressively eroded by one cycle after another. In New Brunswick, you know, trees for the masts of ships and trees for the ribs of the ships and the next thing you know, two hundred and fifty years later you're needing the pulpwood.

LG: Well, part of the definition of quality changes and one of the things in much of the South that is very easy to forget about is the forest was an impediment to settlement. The forest was something to be defeated so you could put the farm in, feed your family. The forests two hundred, three hundred years ago had no value. By today's standards the quality may have been much better but they had no value in a local economy. When six- foot diameter trees are as common as river gravel, well not in Mississippi, we don't have gravel, but deer flies and mosquitoes in the summertime, you place no value on it because it's something that gets in your way. Now because we don't have it, it has a higher value. And part of that is the demands of society changed. The perspectives changed. It's more important to feed the family so therefore that forest was an impediment for civilization.

BS: It's interesting, I can take Michael's argument and argue it both ways. The loblolly pines down here were two foot thirty inches thick. We didn't have mills that could saw a thirty-inch board but we could have made it out of it. Now what we ate supper on tonight was probably one loblolly eight-inch diameter log and we had a board that was four feet wide. The difference was instead of sawing it, it was made into veneer, glued up and made into plywood. The raw material may have been degraded by earlier standards but it was of sufficient quality to satisfy that market and to produce that product. But we lost in time and the enemy of forestry is compound interest. If it weren't for compound interest then we could manage forests quite well. In fact, they did in Europe. There were several countries that in the 1600s established stands of oak for shipbuilding. And in the 1900s their Navy was notified by the state forest service, your trees are ready. We've been growing them for three hundred years now what are you going to do with them.

LG: Where do you want them delivered, and by the way, the bill's due Friday.

BS: So it's time. It's time and demand. I haven't seen too many sailing ships or we don't get many orders for masts anymore.

MC: But you do for telephone poles.

BS: We do for telephone poles and we produce a lot of them because this, this is one of the advantages of not having a state or a centrally controlled forest. We've got sixty thousand forest owners in Mississippi. As long as they have the freedom to manage forestry the way they want there's probably two or three out of that sixty thousand that are doing it right. The thing that concerns me is when you get a mandated forest management, and I've seen this in various other countries where there is one group controlling what is good forestry and what is not. Then that's when you end up with those major problems. Here with the mix of private ownership every private owner has a different objective for managing. Some of them are perfectly willing to let those trees grow until they reach senility. There are others who need the fast turnaround and they want to cut them when they're fifteen. Well, both of those are filling a market niche. But as long as we have enough diversity of ownership and enough diversity of management, we can have both. The company where I bought this one by twelve pine flooring, they are lying some butt some of the pulp and paper companies. They're managing very conservatively because they're making their money on seeing better, clearer, pine lumber. The company next to them is producing wood to make OSB [Oriented Strand Board]. So side-by-side you have two different owners with two different sets of objectives and two different management regimes. I think that's great.

LG: Using the same species.

BS: Using the same species.

LG: One will cut it down at twenty and the other one won't touch it til it hits forty or fifty.
MC: On the other hand, that same economic system is the one that judges value on the basis of compound interest and with a form that's so hard to organize when you least change, and you're ten years ahead.

BS: Yeah, the organization era that will probably change the quickest is the one on the sixty-five year rotation because they are the ones who are small enough and adept enough. They are market oriented in the classic sense. The father manages a forestland. The son manages a mill. He's the one who is in Europe marketing his products. He's is the one who is in South America marketing his products. And even though we are in a management information age where great gobs of management information are distributed or transferred by computer, for that information to have any value it has to be met with intellect. And in the smaller more adept systems, information and intellect can come together to reach a decision. And if we've got seventy-five or a hundred operations like that around the state, if two of them make a fatal error, that means we still got ninety-eight that are functional. If we have four multi national firms in here dominating the wood market and one or two of them fails, we've lost twenty-five to fifty percent of our market. So I'm not saying small is beautiful. Small is not necessarily beautiful. Small can be pretty damn ugly. But I think there's a middle ground in an economy like this that has much more financial and technological agility because the decision time is shorter. The decision process is shorter. They're probably more equipped to match the demands of the twenty-first century economy. And you hear all of this information exchange in other businesses and for us to make the maximum value out of the information transferred we have to have the management systems that can react quickly enough to deal with it.