

**AN INTERVIEW WITH
ROBERT J. GILVARY**

by

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Table of Contents

Introduction	iii
Getting Acquainted with Brazil.....	1
Hired by National Bulk Carriers	4
Early Situation at Jari.....	5
Daniel Ludwig	6
Early Assignments	9
Forestry Activities.....	11
Labor Supply.....	17
Housing Situation	20
The Jari Railroad	22
Airport and Kaolin Deposit	24
Owning the Land	26
Construction Projects	27
The Pulp Mill	28
Leaving Jari	35
Ownership Transfer.....	36
Consultants	37
Equipment Management.....	38
More on Ludwig.....	39
Wildlife and Hunting	42
Life in Monte Dourado	44

Introduction

Robert John Gilvary was born on May 17, 1938. His resume dated February 29, 1984 states that he is an American, but a "resident of Brazil since 1962, with an exception of two years." He has since returned to the United States and owns and operates a hardwood tree farm near Blacksburg, Virginia. In fact, he enjoys the tree farm business so much that it was difficult to schedule the interview that follows. He joked by phone that he would be available on any day that it rained. As it turned out, it was clear the day of the interview, but it was also the day before hunting season opened, so we didn't dawdle--we had to finish that day.

The interview took place in his home office at the edge of Blacksburg. The office looked much the way one would imagine an engineer's or tree farmer's work space would appear, with files, charts, and reports filed, stacked, or spread throughout. His Brazilian-born wife Darlinda made certain that we were well supplied with coffee, and sandwiches, too.

It was Bob's Brazilian period that we focussed on, especially the time he was employed by Universe Tankerships and its forestry project along the Jari River, a major tributary of the Amazon. Daniel Ludwig, the legendary owner of Universe Tankerships, personally interviewed Bob for an engineering job. Ludwig was to purchase about three million acres of native forests, and convert about 10 percent of the area to forest plantations to produce pulpwood to supply a full-sized pulp mill that would be established on site.

Bob's assignment would have daunted most; he would eventually build four towns, four hundred kilometers of truck road and forty-four kilometers of railroad, a 120-acre nursery, foundations for two forty-thousand ton platforms holding a pulp mill and a power plant, a kaolin processing plant, a sawmill, and a maintenance complex. Oh yes, a sixteen kilometer power line and an airport were also on his list of things to do. Part of his task was to oversee the fourth largest fleet of heavy equipment in all of Brazil, consisting of 240 bulldozers, backhoes, scrapers, haulers, and on down the list. In fourteen years, this equipment would move twenty-five million cubic meters of earth.

For recreation, Bob hunted, essentially every Sunday for a decade and a half. He kept a running record of his successes, bagging about thirty different species. The list shows some species shot in the low hundreds and others only a few. He kept a jaguar in a cage under his front porch for eleven years. Although Bob did not mention it himself, Jari legend has it that for exercise (he had been a track star at Cornell and later organized the Jari basketball team) every day he would chop down a tree--a tropical hardwood, not a temperate softwood--a challenge for any axeman. Years later, he still looks fit enough to take on any tree.

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AN INTERVIEW WITH ROBERT J. GILVARY

Harold K. Steen (HKS): You were one of the first to arrive at Jari?

Robert J. Gilvary (RJG): Yes. Johan Zweede got there about two years after the project started, so he can't contribute much to the history of the first two years. Probably I'm about the only one that can remember back that far.

HKS: John Welker came later.

RJG: Yes, much later. Welker came a good two, three years after both Zweede and Clayton Posey.

HKS: Let's start a little bit with your education. Posey described you as an engineer from Cornell. That's how much I know about your background. Civil engineering?

Getting Acquainted with Brazil

RJG: I got a bachelor of civil engineering from Cornell in 1961. I worked with Bechtel for the first year out of school, and then I joined the Peace Corps. John F. Kennedy was president.

HKS: You were that first wave, huh?

RJG: When he said, "Ask not what your country can do for you, ask what you can do for your country," I listened, I took him seriously, and I joined him seriously. That was one of my objectives. Another was to dispel the "ugly American" image prevalent at the time.

HKS: Did you choose Brazil, or that just happened?

RJG: The Peace Corps chose Brazil. I happened to get assigned to Brazil. We were the second project to go to Brazil. I mean, this is right after the Peace Corps was formed. It was formed in late '61, and I joined in about mid '62. We were the second project sent to Brazil, about a hundred of us.

HKS: So, you liked what you saw in Brazil. You learned the language well enough, and this becomes a part of your life eventually.

RJG: Interestingly enough, after the Peace Corps stint, I couldn't wait to get back to North America. I wanted to get away from the tropics, get back to a cold climate, and I went to the opposite extreme. I went to Canada for a year. But just a few weeks after I got back from Brazil, I started feeling the lack of that sense of meaning, of the--of what I experienced in the Peace Corps. Anyway, to make a long story short, I didn't like Canada, and I wanted to get back to Brazil. I went back on my own in '65 and worked for two Brazilian companies, one in Rio de Janeiro, this company called Metalon, which made steel tubing. I built a factory for them. Then a friend I met in Rio had a

friend in the Amazon who owned a sawmill and a diamond mine. I wanted to get to the Amazon, so I went up and interviewed this guy, and he hired me to run his sawmill, even though I had no sawmill experience. What he was looking for was someone he could trust, really, rather than someone with sawmill experience.

HKS: You were in the Amazon when you were in the Peace Corps?

RJG: When I was in the Peace Corps I wasn't in the Amazon. I was in northeast Brazil.

HKS: O.K.

RJG: In geographically a completely different region from the Amazon.

HKS: State of Amapá?

RJG: It was the second smallest Brazilian state, called Alagoas.

HKS: O.K.

RJG: Northeast Brazil is heavily populated and it's almost a desert. It's a semi-desert, as opposed to the Amazon being a tropical rainforest. Completely different environment. Along the coast there's a strip of forest, and where I ended up in the Peace Corps happened to be in this forested area. I worked for, in the Peace Corps, an agricultural cooperative. We were settling people, giving them plots of land and the means to raise crops, which the cooperative bought, processed, and sold. Mainly, we made passion fruit juice. I have no idea if that project is still going on today. You know, I've completely lost contact with them.

HKS: I gather you had the wood footage there and got it cut but it didn't sound like a very large mill. It was for his own needs. Or it was a commercial operation, the sawmill?

RJG: The sawmill we had at this Peace Corps project was just to supply our own needs. We didn't sell commercially. The main product was passion fruit juice, *maracujá* it's called in Portuguese. And we brought these colonists in. This area was in the middle of the sugar cane growing region of Brazil, and you had these huge sugar plantations which employed, quotation marks, vast numbers of people. Actually it was kind of a feudal system. These people were serfs, not slaves, serfs, and utterly exploited by these sugar mill owners.

This was an uninhabited piece of jungle in this strip of forest along the coast. It was about the only area left that was not inhabited. The project was run by a Swiss who had been very active in World War II in the underground against Hitler. This guy was a social reformer all his life. He started this thing on his own, got financing for it. He was an amazing individual, and I was lucky in the Peace Corps to get in contact with such a guy and such a project. And, you know, I fit right in. We were bringing people in, settling them, and they needed roads and other infrastructure.

HKS: What was there about Brazil and the tropics that you didn't like? Isolation, or you just weren't used to it, or...?

RJG: It's hard to remember now, because I've liked Brazil ever since then. I think at the time, I didn't like the hot climate. I eventually adapted to it and now prefer it. Of course, I was in a relatively good position in the Peace Corps, with the backing of the guy that ran this project. But it was still very frustrating. You could never see where what you were doing was really going to continue on without your presence. That in a nutshell was the frustrating part. Once this guy left or died, I thought the project would probably die with him, and unfortunately I never got back there to see if it did. He died a few years after I left the Peace Corps.

HKS: O.K., you went to Canada. It's cold, you didn't like that. You went back to Brazil, two different jobs. So you had decided by then, by the mid-60s, that Brazil was O.K. This was really where you wanted to work.

RJG: As soon as I got back to North America, I missed that sense of doing something really important and useful that I had in Peace Corps. I wanted to get back to that. I went back to Brazil on my own and found a job, this job in Rio. And then that led to the Amazon.

HKS: Was that a risk that you took, that you could find a job? Were you pretty sure that you'd find something from your previous time there?

RJG: No, it was a complete risk. I had no idea I was going to get a job. I had enough money to pay my way back in case things didn't work out, but it was definitely a risk. Anyway, when I took this job running a sawmill in the Amazon, I only stayed there about six months. And I liked it, but the company had no money. They were going nowhere, and I was beginning to see I wasn't going anywhere either. So I said, I better bite the bullet and get back and start earning some money, get back to the U.S.

HKS: So you weren't paid U.S. wages there?

RJG: No, I was not. I was paid in Brazilian wages, in cruzeiros, local currency. And that was it. Even though this company was owned by an American, he was in Brazil for most of his life. He was as Brazilian as most Brazilians. That's why I came back, left Brazil after this second stint there.

HKS: You were working in Portuguese, though, when you were in Brazil.

RJG: All the time, right. I became fluent in Portuguese. By the end of the Peace Corps experience I was fairly fluent, and then after these roughly two years there, between the company in Rio and the sawmill in the Amazon, I was completely fluent in Portuguese. Now it's a second language. Even though I speak it with an accent, I can speak it just as easily as English.

HKS: I don't know what to call them--I'll call them Indians for lack of a better term--the local natives. Do they speak Portuguese, or do they speak an Indian language, like Navaho or something?

RJG: In Brazil?

HKS: The laborers, right, you worked with.

RJG: Portuguese is spoken uniformly throughout the country, and you wonder how that came about. With the size of the country and the isolation between different regions of the country that was prevalent--well, in the Amazon is still prevalent today; until the Belém-Brasília highway was built, the Amazon was completely separated from the rest of Brazil. And yet, you can go to the farthest corner of the Amazon and find someone living up the remotest stream that flows into the remotest river, and they will speak Portuguese that you can understand as well as someone that you meet on the streets in Rio. I don't know how this came about, but it did. It's amazing.

HKS: That's interesting.

RJG: Yeah.

HKS: My friend who went to Peru learned Spanish, but he had to have a translator when he worked with the locals in some village in the Andes, building an irrigation project, as I recall. That made him distant from the people he was working with.

RJG: When I traveled in Bolivia and Peru, I experienced the same thing. But for some reason in Brazil, except for those Indian tribes that remained isolated, everyone else speaks Portuguese.

HKS: You needed some money, so you went to Pennsylvania and started building state highways.

Hired by National Bulk Carriers

RJG: I was from there originally. I worked with a contractor building a stretch of interstate highway. After I'd been there close to a year, a friend of mine in Belém called me or wrote me and told me about this big project that was starting up in the Amazon, an American owned company. She gave me the name of the company, National Bulk Carriers.

HKS: Yes.

RJG: O.K. I found out where their headquarters was, and at that time it was on Lexington Avenue in New York City. I drove to New York. I walked into the office and said, I hear you have a big project in Brazil. They said, Yes, we do. I said, I'm a civil engineer and I'm interested in working for you. At that time I hadn't the slightest idea who Daniel Ludwig was. I'd never heard of him. I didn't know what National Bulk Carriers' business was. Anyway, the guy I was talking to was the guy that Ludwig had responsible for the project at that time, a guy named Frank Penn.

I guess Frank liked me, and we got talking. He said, yes, we do have an opening. It's a forestry project where we need to establish a two hundred fifty thousand acre plantation

of this fast growing species called gmelina. He explained to me something about what the project was about. Then he said, Everyone that goes to the project Mr. Ludwig interviews. Mr. Ludwig is the owner of the company.

HKS: Is that right? He actually interviewed you?

RJG: Yes. He said, Let me send you in to talk to Mr. Ludwig for a while. Again, I had no idea who he was or.... [both laugh] So I went in.

HKS: Describe your first impression of the man. I've read about him in newspaper accounts, what he looked like and so forth.

RJG: He was seventy years old at the time, and he's rather ordinary looking. The first thing he said to me was. Well, Gilvary, I see you were in the Peace Corps, eh? I said, Yes, sir. He said, Didn't spoil you, did it? I said, No, sir, I thought it qualified me even more for projects like the one you're working on in Brazil. We talked for a few more minutes. I don't recall what else was said. And that was it. The interview with him lasted perhaps five minutes. Then I went back out and talked to Mr. Penn, and a few days later I was offered the job, at a lower salary than I had asked, but I jumped at it anyway. I think I started at eight hundred dollars a month, or something like that.

In the meantime it was Frank Penn's secretary, Miss Antonucci, explained to me that Mr. Ludwig [laughing] was the richest man in the world, and what his business was. He owned the largest fleet of supertankers in the world, he was essentially the man that had invented the supertanker, and that he had about, at that time, probably sixty different companies around the world. I said, Fine. Two weeks later I was off to the project in the Amazon.

HKS: I don't want to make you feel uncomfortable by being too personal, but I'm interested in this salary. That salary was not as competitive--I thought it would be a lot more than you'd make in the States. Was it more at that time?

RJG: No, it was exactly what I was making as an engineer on the highway project. I wanted to get back to the Amazon, because I had gotten Amazonitis.

HKS: I can understand your point of view. I thought how hard it is to attract good people. You have to hire them away from jobs--that they'd be competitive. But apparently not.

RJG: I think that probably went for almost everyone else, except for me. I would suspect with Johan too, he would have done the same thing. He probably would have taken equal or less than he was earning in the U.S., because I remember him telling me he had a similar experience when he left Portel, where he worked for GP in the Amazon.

Early Situation at Jari

HKS: That's how you got started. You arrived. Clayton went into some length about conditions on the ground when he got there. You were ahead of Clayton?

RJG: Much earlier. The project had only been going a few months--

HKS: Clayton describes it as a project run by a bunch of engineers. So you're one of those guys.

RJG: No. I was the first engineer, but there was a forester there who had established the first nursery, and who had seedlings growing when I got there. His name was Tom Bunger. That's him there [photo] in the hard hat.

HKS: Oh.

RJG: He was the original forester, the only one. His responsibility was to establish the nursery and plant and grow the seedlings to plant the twenty thousand acres that was supposed to be cleared the first year. As it turned out, much less than that was cleared.

HKS: It must have been relatively primitive then. I mean, the infrastructure hadn't been developed. That was part of your job, to create a town.

RJG: My job was not defined. At that time, no one from Mr. Ludwig on down really had a vision, I think, of what the project was going to develop into. The objective was to clear twenty thousand acres and plant it to gmelina this first year. No one thought about building a town, or roads, or railroads, or anything else. I mean, this was the objective. When I got there, it was just a small construction camp, really. You know, some primitive housing, no family, everyone was there on bachelor status. A small landing strip had just been completed for single engine aircraft, and this was their means of communication with the outside world. When Mr. Ludwig bought the project, bought the land, he actually bought out the Brazil nut business that the former owners had on the land. This included several riverboats, one of which was a substantial vessel, two hundred feet long and diesel powered. It could haul about three hundred people at a time from Belém to the project. And this is how most [emphasis] people got there, workers other than supervisory personnel. We flew out and back in small rented airplanes. The Cessna 206, a six seater single engine aircraft, was the aircraft we used in the first few years.

Daniel Ludwig

HKS: I thought there was a master plan. Obviously not. You called him Mr. Ludwig. Did you know anyone who called him Daniel or D. K. or anything?

RJG: [slowly and emphatically] Heavens, no. [both laugh]

HKS: Would he have been offended? Or just his bearing was such that you wouldn't even think about it? Or the fact that he was so rich, I suppose.

RJG: He's probably the only person that I refer to as Mister. He commanded that respect, let's put it that way. His personal friends, those of other wealthy men who were his friends, would call him Daniel or D. K. However, I was never in their

presence. My contact with him, obviously, I was always an employee. And even when he was there with other friends of his, I never heard anyone call him D. K. or Dan. [both laugh]

HKS: How did you know what to do? Who was your supervisor?

RJG: At that time the project manager lived in Belém, and there was an on site superintendent. The project manager at the time was--and he was not the first, even he [emphasis] was not the first one. I don't know if Clayton got into how many project managers...

HKS: Thirty of them or something.

RJG: Right. A lot of them went through. But at the time this man here [photo], Fredrickson, was the head of the project, living in Belém. And this guy here, Charles Rowcliffe, was the on site superintendent.

HKS: So he came up and back the same day wearing a suit and a tie, right?

RJG: There he is there in a coat and tie, which explains why he didn't last very long. [both laugh] Like so many of them. As it turned out, when I was hired I flew down to the project with Mr. Fredrickson. We happened to be on the Pan Am flight out of New York on that same day, and he barely acknowledged my existence. He was Danish and he had a wealth of experience. He was more of a diplomat than anything, and with Ludwig that sort of personality led to disaster fast. With Ludwig you had to be concise and to the point. He had no patience for diplomacy. It eventually was his undoing, which I'll get to ultimately. He wanted people that got things done and that didn't give him any bull. And those are the only ones that survived on the project.

HKS: I like you coming back to Ludwig because he's sort of a fascinating character.

RJG: Yes.

HKS: In terms of micromanagement, did he only talk to Fredrickson? Or when he was there, he walked up to you and asked you what you were doing? Did he know your name, and he knew you were an engineer and asked you directly to report? Or did you go through some hierarchy?

RJG: He essentially paid no attention to most of the general managers. When he came to visit the project, if it were a forestry subject he would talk to Johan Zweede, and if it were a construction subject he'd talk to me. I've got a bunch of memos here from him which will indicate to you the detail this man got into. [laughing] I kept these because I think they're priceless. There are things there you will not believe. Here's a billion dollar project and the owner, who is the richest man in the world, is communicating with someone like me on subject matter like this.

HKS: Give me an example of this, trivia obviously.

RJG: Let me pull one out of the hat here. To R. J. Gilvary from D. K. Ludwig, December 30, 1976: Enclosed find a letter from Mr. Buford of Hannah Mining

Company regarding tests on stabilizing material that you propose to use in our industrial section (he means for the industrial site or the pulp mill site). I suggest we follow through by an application of clay on top of the sand and also by mixing the sand with the clay. Indications are that this should materially improve the feasibility of using this material. You will note that by applying the material to stiff clay, the material is moved up from one ton per square foot of soft clay to three tons per square foot of stiff clay (what he means is that the load bearing capacity goes from one ton per square foot to three tons per square foot). By putting a balance of stiff clay and rolling it to a blanket of six inches, it should not be too exorbitant in cost. D. K. L.

HKS: How does he know that? A report?

RJG: This friend of his from the Hannah Mining Company told him this.

HKS: O.K.

RJG: They just go on like that, you know. The guy was something. [amused, but admiring]

HKS: Did he--I don't know how often he came down--but did he really follow through? I sent you that memo back so and so?

RJG: Oh, yes. You'll see in here that several times he chews me out for not responding [both laugh] to a previous memo.

HKS: Incredible. Incredible.

RJG: Yes.

HKS: When you think of all the other companies around the world he owns--

RJG: Although at the height of the construction of the pulp mill, '76 through '78, he probably spent, I'm guessing, eighty percent of his time on the Jari project.

HKS: O.K. But still, if there wasn't a plan, how did you know what kind of roads to build? What kind of truck traffic there would be, years in the future?

RJG: That's what I started doing, now we had an engineer there. The original objective was to establish a two hundred fifty thousand acre tree farm of gmelina--nothing else. This fast growing exotic species is native to Asia and we had seeds imported from Africa. The objective was twenty-five thousand acres a year or ten thousand hectares over ten years to establish the plantation of two hundred fifty thousand acres and then industrialize. In the beginning it was not defined what was going to be done with the fiber from this tree. There were talks of a pulp mill right from the beginning, a hardboard mill, sawmill of course, possible plywood mill.... I'm guessing now, but I don't think a decision was made to actually build a pulp mill until '74 or '75.

HKS: Was this perhaps prudent on his part--he wanted to make sure the plantations had adequate yield, or...? What would have been the market if he had never built a mill?

RJG: I think his original concept was that there would be a severe shortage of wood fiber in the late 1980s, and that whoever had the wood fiber would make a bundle. That's what prompted him. I think pulp and paper were always there, but not necessarily as the prime product or the only product. First of all, he thought the tree would grow much faster than it did, so he envisioned saw timber and actually peeler logs for plywood.

HKS: I don't want to get ahead of the story, but would you have done a lot of things differently had you known what ultimately would have been the size of the infrastructure? Or did it actually work out pretty well?

RJG: One mistake that was made--which was irreversible even when I got there--was the location of the town of Monte Dourado. It should have been next to the pulp mill to avoid the sixteen kilometer commute that everyone who worked at the pulp mill and the industrial site there had to make. Other than that I don't think there's a major disadvantage in the lack of planning. I mean, there were adequate town sites next to the pulp mill.

HKS: O.K.

RJG: Monte Dourado was kind of just picked randomly as a construction site. People waded ashore there, at what came to be Monte Dourado. The first nursery was established there. Even by the time I got there, with the construction camp plus the nursery, you had considerable, significant infrastructure already there.

Early Assignments

HKS: What was your main job? Roads?

RJG: We conceived of what the project needed in the way of construction, then we designed what we conceived of, and then we built it. We didn't use outside contractors. Everything was done in-house. It was a unique opportunity for an engineer, really.

HKS: What sort of approval process did you have? At each step of the way? Or random? How did it work?

RJG: We prepared budgets each year. The budgets were seldom followed. It was obvious that we're establishing this two hundred fifty thousand acre tree farm. We needed to have all-weather roads just to get out to plant the trees. Obviously, we're going to need these all-weather roads to bring the wood to whatever processing plant we build. This is one thing I [emphasis] pushed for right from the beginning, let's lay the roads out in at least where we think they should be to ultimately get the wood to the mill. Maybe we don't have to make them as wide as we will need to eventually, but let's at least put them in the right place, so we can at least widen them later. That kind of helped to define the road system.

HKS: Did you have a quarry and a crusher, the whole works?

RJG: No. At that time we didn't even know there was rock there. This being the tropics, we were blessed with some naturally good road surfacing materials. We had river run gravel in some places, and we had laterite, both iron based and aluminum based laterite. The iron based laterite was an excellent road surfacing material. So we never actually had to use crushed rock on the roads.

HKS: There were no so-called environmental constraints on getting gravel out of the river?

RJG: We didn't get it out of the river. These are deposits far from the river.

HKS: That's true.

RJG: And at that time, in the late 60s, early 70s, there were no environmental constraints anyway.

HKS: O.K.

RJG: I don't want to get ahead of the story. We eventually found a very good deposit of rock, a very hard diabase rock, which turned out to be an excellent concrete aggregate. That was a main use of the rock, plus ballast for the railroad we eventually built.

HKS: How many engineers were there? Who had this kind of experience? You built roads in Pennsylvania. You had some sense of at least the basic physics this would require.

RJG: I was the only engineer, until we got close to building the pulp mill. And then I hired a few others.

HKS: Oh, I thought there were lots of engineers running around.

RJG: No, no, I was the only one.

HKS: O.K. You must have been pretty busy.

RJG: I was busy all the time. All my life I've been accused of trying to do too much [laughs] by myself. But in the process I saved Mr. Ludwig, I think, hundreds of millions of dollars.

HKS: But you felt generally confident you had the technical skills. There are so many specializations in civil engineering, and you had to have them all.

RJG: To put it in perspective, I grew with the project. We started out small, just trying to plant twenty-five thousand acres a year. The first two years we did not succeed. This gave me time to learn. It gave me time to build up my construction crews. I eventually had excellent [emphasis] Brazilian supervisors and superintendents. They were the ones that got the job done. The engineers helped.

HKS: But did you send away for technical manuals? You figured out that laterite was excellent aggregate for concrete. How did you know these things? Experimentation, or were there books on--?

RJG: In the case of the road surfacing material--the laterite and the river run gravel--experimentation. The rock was obviously a good concrete aggregate. Of course, I looked it up in my engineering books, too. Ludwig had geologists in the Amazon there, and I would consult them occasionally. I had them look at it and they said that diabase is one of the best, hardest, and densest rocks on the planet. It will be an excellent concrete aggregate. These are the geologists that discovered the kaolin deposit on the project, which I inadvertently told them about. I didn't know what it was. [laughs] I don't know if you heard about the bauxite deposit.

HKS: No.

RJG: An area farther up the Amazon River, this actually wasn't in the same area of the Jari project, turned out to contain one of the largest bauxite deposits in the world. Ludwig never developed it, he eventually sold it.

HKS: The only thing I know about engineering was an example when I lived in California. There was a particular sand right along the coast that was excellent for using in concrete. The engineers tested it.

RJG: Right.

HKS: Did you actually test the material?

RJG: No, we didn't. When we actually had to produce structural concrete for foundations for the pulp mill, then we did test it.

HKS: Right.

RJG: But we already knew it was good stuff, and it tested very well. The initial uses for concrete were for housing, where we weren't concerned about strength.

HKS: Did you feel your isolation, the distance you had from technical support, was a serious problem?

RJG: I considered it an advantage. [both laugh] We were not bothered by extraneous circumstances.

Forestry Activities

HKS: Tell the forestry story.

RJG: Before I got there in the first dry season, about one thousand acres had been cleared. These one thousand acres were planted from seedlings grown in the original

nursery at Monte Dourado by Tom Bunger. The first year I was there, or really the beginning of the second year of the project, about seven or eight thousand acres were cleared, and Tom Bunger did not have enough seedlings to plant this area.

There were two forestry debacles in the early years. That was the first one. The second one was when most of the seedlings that were planted died because of a drought. The reason this guy got fired, like I'm saying, was that he didn't have enough seedlings in that original nursery to plant even the smaller amount of land that was cleared. He was a young guy. I was twenty-nine at the time, and I think he was about the same age as me.

HKS: It seems rather fundamental, from a distance, he needed enough seedlings per acre and so forth.

RJG: Yes.

HKS: Why didn't he?

RJG: This is going back close to thirty years. I just can't remember the details about why there weren't enough seedlings.

HKS: But in Ludwig's plan, if you made a mistake like that, you weren't the right guy for the job. Is that right?

RJG: This was a guy fired for an obvious technical blunder, yes. Now, after this forester was fired, we went for a long time with no forester on the job. Ludwig hired a construction guy to run the project after this. At this time the general manager living in Belém was eliminated and the general manager had to live at the site.

HKS: Clayton said when he was almost fired his first year, he went to somebody in Caracas, an engineer type. Clayton had predicted that the seedlings would die.

RJG: Yes. Clayton definitely predicted that, and Clayton is the one that told Ludwig what was happening, and prevented further disaster in doing so.

HKS: I ask this delicately. Were there any engineering debacles? I mean, the forestry ones got a lot of press. People wanted Jari to fail, I guess, because all we read about in the States was, it's bad forestry, it ain't working. Were there engineering problems?

RJG: I made a few mistakes over the years. But they were relatively minor.

RJG: So you were essentially chief engineer on site during all your time there.

RJG: I was the only engineer at first. I was really the manager of engineering and construction for the project. It was a division like forestry was a division, and we reported to the general manager. One mistake I made which cost Ludwig some money was the original water system, potable water for the town of Monte Dourado. Instead of using water from the river and treating it, I thought wells would be better. I had wells drilled and pumps bought for them. It turned out to be very difficult to pump the

water, and the pumps were made in Brazil, and they were no good. The well system did not work. We eventually built a water treatment plant to use river water. I think that's probably my worst single engineering error in the years I was there.

HKS: But you obviously didn't get fired for it.

RJG: I don't think Ludwig ever realized [both laugh] this particular problem.

HKS: When did the foresters arrive? My perceptions are what Clayton told me. And he came a little later in the game.

RJG: Yes.

HKS: He said that you guys were scraping all the topsoil off with your damn tractors.

RJG: Yes, but we were doing it with the forester there. This was part of the problem of the first planting. Ludwig never conceived of clearing by hand. To Ludwig the way to clear was to get the biggest bulldozers you could, which would get the most number of acres cleared per hour, per day, however you wanted to measure it. This is the way the clearing started, and the roughly eight thousand acres cleared the first year were all done with large bulldozers, Cat D-8s and D-9s. They were fitted with special clearing blades called KG blades. They were made by the Rome Plow Company in Georgia. The blades were designed so that you would get a minimum of soil disturbance. The blades were designed to shear the trees off at ground level, not uproot them. Well, that worked well on your softer trees, but the extremely dense Amazon hardwoods, I mean the thing just wouldn't shear. They eventually had to be uprooted to get them out of the way. So you did get soil disturbance in spite of having the special blade.

What was cleared was pushed into windrows, and then the windrows were burned. So even if you had no soil disturbance, you would obviously have more nutrients where you burned in the windrows than between the windrows. With the soil disturbance, you had the little bit of topsoil plus the nutrients from the burning in where the pile was, and not much in between. So that when the area was planted, you get dramatic differences in the rate of growth. The gmelina shot up where the windrows were, and practically didn't grow at all between the windrows.

HKS: How many tractors did you have? Ten? Fifty?

RJG: When I got there we had nine D-9s, and we then got twenty-one D-8s. Whatever we could get with those nine D-9s originally was what we were supposed to clear, and I forget what it was. The first year we were supposed to get twenty thousand, twenty-five thousand acres was when we got the twenty-one D-8s, which was in the dry season of '68, six months or so after I got there.

HKS: So that part of your job would be making sure spare parts came in, and mechanics. The maintenance of that equipment in that location must have been a major challenge.

RJG: This was not only a major challenge, but the most difficult of all the problems, right.

HKS: How about the mechanics? Brazilian mechanics?

RJG: Brazilian mechanics are very [emphasis] good, if properly supervised. I have to back up. When I got there, the general manager had hired the Brazilian subsidiary of Morrison-Knudson to actually run the project and do the clearing. There was an American superintendent on site at the time, a guy named Bob Romans. He did have an engineer there, that's right, when I got there. I'm forgetting this. But his job was essentially to measure the areas cleared, not to build any roads yet. At any rate, they only lasted a few months. I mean, three or four months after I got there, Ludwig threw the general manager and them out. They were really not a significant player, let's say, in the project. And then the other engineer left, and that was it. I was the only one for many years like I've already explained.

HKS: But your basic supply of spare parts; was there a major stockpile in Brazil itself?

RJG: You had the local Caterpillar dealer in Belém, who was supposed to have a stock of spare parts, but they never were able to meet our needs. This project was probably ten times their total volume per year, previous to this project starting up. Essentially the parts had to be ordered out of the United States.

I was never responsible for maintenance of equipment. Maintenance was also a separate division, and this created problems. Maintenance had to maintain the forestry equipment and the construction equipment. Of course, initially it was all construction equipment. It was also a separate division. But I certainly got involved in it, because I needed to keep my machines running.

HKS: Did you have a lot of problems?

RJG: Once we got the logistics set up, it was not that great a problem. With the riverboats that we had, we had the means of supplying the project with one or two boats a week from Belém. And you could air freight. Belém has an international airport. You could airfreight emergency parts into Belém, get it on a boat, and get it out there reasonably fast.

HKS: A D-9's pretty big. Did that come in on a barge?

RJG: They were put on barges, flat top barges, the initial one.

HKS: There had to be port facilities when you got there obviously to off-load. I don't know what a D-9 weighs.

RJG: Forty-five tons.

HKS: Forty-five tons.

RJG: It's not difficult to off-load from a flat top barge. Just cut down a few trees and pile them against the bank and run the barge ashore.

HKS: Oh, I see what you're saying. Just drive it off.

RJG: Fall a few trees and get them positioned so you can walk it up. It's not difficult to off-load heavy equipment, at least Caterpillar tractors off a flat top barge.

HKS: Back to forestry. Was Clayton's arrival significant? He came down as a geneticist to work in the nursery. He wasn't really in a decision making position officially when he came down. I don't know if I'm getting ahead of the story or not, but when forestry's sort of taking off on its own.

RJG: O.K., we've gone over the first forester and what happened to him. Then we have the interval between him leaving and Clayton arriving. That interval was something like a year.

When I got there, February of '68, it was already the beginning of the rainy season. The rainy season essentially starts in January. That original nursery, the one located in Monte Dourado and planted by this forester who got fired, was to plant what was cleared before I got there. It was only about a thousand acres. This was planted in the rainy season of '68 under this forester. O.K., he didn't get fired then. He had enough for those thousand acres. It was the next year. The next year is when we cleared about eight thousand acres. That's when they ran out of seedlings. They didn't have enough to plant those seven to eight thousand acres.

HKS: O.K.

RJG: That would have been the '69 rainy season. Tom Bunger, the forester, was fired. Then Clayton got there in time to establish the nursery for the 1970 planting season. There was probably only a few months between Tom Bunger leaving and Clayton arriving. I know they never met. So Clayton gets there in the second half of '69, and he has to establish a nursery to plant twenty or twenty-five thousand acres, which now we were clearing by hand. We were going to meet that goal for the first time. It was decided to give up machine clearing and go to hand clearing, just falling the trees in place and burning the trees in place. This decision was made between the '69 and the '70 planting. Clayton got there with the responsibility of establishing the nursery and having the seedlings to plant twenty-five thousand acres. Another forester named Don Cole came about the same time Clayton did. Clayton must have mentioned him.

HKS: I don't recall.

RJG: He and Clayton never got along, to put it mildly. He was older than Clayton, he was probably in his mid-forties or around fifty, and Clayton was my age, which was about thirty. This other guy, this Cole, was responsible for the actual planting. I don't think Clayton was actually subordinate to Cole, but I can't remember exactly. This was a good time, when Clayton and I built that nursery. We had a lot of fun doing it together.

HKS: The two of you got along.

RJG: Yes.

HKS: Which is fortunate, I suppose.

RJG: We not only got along, but we've remained good friends till today. I'm still in contact with him a couple of times a year at least.

HKS: He's got thousands of slides, but he won't look at them or give me some. I've been working on him. He seems to have the best photo collection.

RJG: He probably does, because he took pictures. I never took a picture in my life, and I have a few pictures taken by others. O.K., so we built the nursery. Clayton got the seedlings planted for twenty-five thousand acres, and we got that amount cleared to be planted in 1970. This, then, is when the seedlings died from drought. The rainy season delayed in coming in. We had a couple of rains early. They started planting, then it stopped raining, and a very large percentage of the seedlings died.

HKS: He said he had enough seedlings to replant.

RJG: He did, right. As I said before, Clayton is the one that finally told Ludwig what was happening. This resulted in Cole being fired, and in my opinion, he deserved to be. For some reason he didn't see what was happening. It was obvious to me, and certainly more than obvious to Clayton.

HKS: Well, it's interesting.

RJG: You'd walk out there and watch where they planted, and you'd see them wilted. [laughs]

HKS: It's interesting, having extra seedlings, because that could almost have been a bungle in the sense of having to throw away a lot of seedlings if the original planting had worked.

RJG: This nursery was well planned, well constructed.

HKS: Did you help construct the nursery? Was that part of your job?

RJG: There was an elaborate storm drain system to keep the nursery from washing away in the intense rain. It was a sandy soil area. Erosion control was a major engineering problem for the nursery and really for the entire project.

HKS: By then he had a corner or someplace, he was growing pine seedlings, too. Somewhere along there he gets--

RJG: Right. Somewhere in there he started experimenting with pine, and he probably told you the story of how he got Ludwig to see the pine.

HKS: Yes, but you tell it.

RJG: He got Ludwig to see the pine by driving him past the pine, never saying a word to Ludwig, which is the way to do it. Ludwig said, what's that? And Clayton said,

that's pine. He said, Stop here! Hey! That's good looking stuff! [both laugh] Because if he had asked permission to do it, he probably would have gotten fired.

HKS: Sure.

RJG: Ludwig was set on gmelina.

HKS: What were Brazil's concerns about the project? Was that a constraint on you, that the public or the government of Brazil. Was there some sensitivity to this at certain points of the operation.

RJG: There was no real problem in the first years. When I got there, the president of the company was a Brazilian general, an ex-general, General Tubino. At that time the military ruled in Brazil. In fact the years that the military ruled in Brazil is when Brazil made the most progress that they've ever made in their history. Around June of 1968 another military man, an ex-captain, was hired--Heitor Ferreira--who eventually became the secretary to the president of Brazil that succeeded the one that was in office at that time. Heitor Ferreira was very capable. Ludwig liked him a lot, and reluctantly let him resign from the company because he knew he was in line to become the secretary of the next president of Brazil.

To the Brazilian public, the project was always looked on, right from the beginning, as a cover up, because it was difficult if not impossible for the average Brazilian, or any Brazilian probably, to believe that we were in the Amazon planting trees. [both laugh] The fact that we were spending a billion dollars doing it didn't seem to penetrate. Here we were, wiping out the native forest--and that's just what we were doing--wiping it out and burning it up. The only wood we used from the native forest, as you already know, was what we used for construction, which was of course a tiny percentage of the actual forest cleared. You'd talk to the average Brazilian on the street, and he would say, Come on, you guys aren't out there planting trees. It's a cover up for your gold and diamond mines, right? But this never hurt the project in the initial years. It only hurt the project as the project grew. About the time we were building the pulp mill the project got so big that it got all this bad press from the Brazilian press. Which of course is what eventually forced Ludwig to give the project away.

Labor Supply

HKS: Ah, you mentioned labor supply. Did you have access to good mechanics, skillful people, or you could train them to be skillful?

RJG: No, you didn't--in engineering and construction, at least, you didn't have to train people. They existed in Brazil. You had to seek them out and find them and hire them. Brazilian construction companies became some of the biggest construction companies in the world. They had huge hydroprojects going on all over the country, immense industrial projects, and the skilled labor existed in Brazil. You needed to seek them out and hire them.

HKS: It wasn't a case of Bechtel in Brazil, it was Brazilian companies.

RJG: Brazilian companies, right. I never looked outside Brazil for skilled labor, because I knew they were there in Brazil. I may be getting ahead of myself, but I better say this while I'm thinking about it.

HKS: Sure. By all means.

RJG: The reason that the project was taken from Ludwig, stolen from him by the Brazilians--the reason he lost six hundred million dollars of his own money--is because he did not give value to Brazilians. He never realized, in spite of me [emphasis]--and I was the only one that tried to point this out to him--that the talent existed in Brazil to do everything he wanted to do. You did not have to go outside the country. He hurt himself, you know, by hiring so many foreigners, outside of Brazil, and by giving zero attention to public relations. If we had this to do over again; Ludwig or his successor would still own the project. We would have built the second pulp mill. We would have built the paper mill. We would have built the hydroproject. I'd still be there building, hopefully, which [laughs]--if he had only paid attention to this detail. But, you know, it's sad, but it is the main reason for Ludwig's demise in Brazil.

HKS: Give me an example of how you would recruit certain skills. You'd run an ad in the paper in Rio or something?

RJG: Right. That was one way to do it. But most of the talent existed in northern Brazil, or at least northeast Brazil. Most of your skilled labor in Brazil are people of modest origins. So the people working for these big construction companies on huge development projects all over the country tended to be from northeast and northern Brazil. They migrated to southern Brazil, where they were hired and trained by the large Brazilian construction companies.

HKS: I see.

RJG: You might catch them even in Belém. We recruited a significant number of people. But we advertised in papers all over the country and got really qualified people.

HKS: Clayton was saying that it was difficult to recruit technical people from southern Brazil. It's like going to Oklahoma if you live in New York.

RJG: Yes.

HKS: The Amazon wasn't the place you wanted to be--

RJG: And he's right. Highly [emphasis] technical people, like foresters and engineers. But I needed relatively few engineers. We were mainly construction. We didn't design the pulp mill. The pulp mill was designed by someone else. We built all the onshore facilities for the pulp mill. It was about seventy million dollars of the three hundred fifty million total that the pulp mill cost. All that was built by us on site.

HKS: With all the shifts in managers, how did that affect your ability to cope from day to day? They went through thirty directors in ten years. There must be a lot of confusion.

RJG: [laughs] There was. I just happened to be the type that could adapt. Eventually most of the general managers were superfluous. I mean, you would treat them politely as your boss, but your real boss was Ludwig. Now, there were a couple of general managers there that were good and that were trusted by Ludwig, not the least of which was Elmer Hahn, who was there during the construction of the pulp mill. Mr. Hahn and Mr. Ludwig were like that [gestures], and talking to Mr. Hahn was almost like talking to Ludwig. But he was the exception.

HKS: But did you waste time, get started in one direction and the new guy would come in and say, No, that's wrong? Or that didn't affect what you were doing? Did it affect what you did, with all these turnovers in general managers?

RJG: It didn't affect me because I was somewhat of a tyrant in this respect and a bit ruthless. This project was my whole life, and I wanted it to succeed. I didn't let these things deter me from designing and building what I thought the project needed. In a nutshell, that's it.

HKS: O.K., it's hard to imagine that there wasn't some inefficiency from all this turnover in general managers.

RJG: To this date there's probably still some doubt as to the viability of the Jari project as a forestry project. I can't say whether it was successful or not.

HKS: Johan would have an opinion on that.

RJG: Johan would definitely have an opinion on it. But I think as a construction project it was definitely highly successful. We got what we needed to get done, on time, and at not only a reasonable cost but an amazingly low cost. I don't know if you realize that the estimated cost of building the pulp mill on site by traditional means was about four hundred fifty million dollars. And by doing it the way we did it, by building the actual mill in a shipyard in Japan and towing to the site, we cut about two years off the construction time and saved about a hundred fifty million dollars. It was built for about three hundred million.

HKS: And even to Ludwig a hundred and fifty million dollars is important, right?

RJG: Right, exactly. The only thing, the only thing that he did not finance himself, by the way, was the pulp mill. He got financing for that, three hundred million.

HKS: Construction camps and access roads to plantations. What more is there to say about that? Obviously you needed construction camps, but they were temporary, right? This is where the workers lived in order to build what they're building. Or did those camps turn into towns?

RJG: They turned into towns. The town of Monte Dourado would not exist, I guess, if it weren't for me. No, I don't guess. It wouldn't exist. The project had grown so much that we, in order to retain supervisors and even foremen over the long haul; it wasn't just a two-year construction project. This was a ten-year construction project or more.

These people needed to have their families with them. O.K., it was also obvious that, over the life of the project, the people that were going to operate it needed permanent housing. So, O.K., let's start building the housing now, and we'll house the construction people for this very long construction project, which then will eventually be turned over to the operating people. So I started building houses in Monte Dourado around as early as 1970. Kind of sneaked the first ones in there, at least for this type of personnel, not for staff, your expatriates.

RJG: Did you saw your own lumber for that?

RJG: Yes, we sawed our own lumber for that.

HKS: And that was adequate for your building needs.

Housing Situation

RJG: For the first couple of years. And then, Mr. Ludwig also realized he needed to build housing. This was somewhere in '72-'73. He realized this too, that we need to start building housing for our permanent staff, but our construction personnel will live in it temporarily. So he then sent to us a set of concrete forms to build concrete houses. We started with wood houses, right, and we were sawing our own wood. At that time he owned the company that made these concrete forms. They were aluminum panels. He sent them to us, and it turned out to be a very good type of housing for the tropics and for what we were doing. In spite of having this rot resistant wood, the concrete was better yet. We had the rock and the sand for the concrete, which is ninety percent of the volume of concrete. All we had to do was import the cement, bring it in from outside.

HKS: Interesting. Interesting.

RJG: It took off. Monte Dourado went from a construction camp to a town of twelve thousand people by the time I left in 1980, by the time the pulp mill was built. We also built satellite communities for the plantation, and plantation management, and harvesting--three satellite communities away from Monte Dourado, each one of about three thousand people.

HKS: Was part of the disaffection of the Brazilian press and public that you had inadequate schools, hospitals, and so forth? Or was it just that they didn't like the idea you were there at all?

RJG: It was strictly jealousy that Americans, gringos, were in their precious Amazon and developing it, which is something they had not succeeded in doing in the three hundred fifty years they owned it. Period.

HKS: So some of the opposition could have been high up in the government?

RJG: The government people that knew of the project and understood it, were for it. But the bad press, the pressure became so great against the project that even these

people were afraid to speak up in its defense. This hit its peak about the time I left, around 1980, after the pulp mill was up and running and starting to export and get some money back.

HKS: We've talked about building the nurseries. You said that Monte Dourado was in the wrong location, as it were. That's because it grew? It wasn't designed to be a full-fledged town originally.

RJG: No, it's a town, it's a full-fledged town with all the amenities: supermarket, school, hospital, slaughterhouse, and you name it. It's just that it's neither near the plantations nor the pulp mill. There's sixteen kilometers between the pulp mill and Monte Dourado. So everyone that works at the pulp mill has to drive that sixteen kilometers every day.

HKS: And the pulp mill was where it was because--

RJG: The pulp mill had to be where it was. It's essentially the head of navigation on the Jari River. Upstream from the pulp mill the depth of the channel goes from an average of ten meters to something like three meters.

HKS: I see.

RJG: There was no choice. The pulp mill had to be where it is to get ocean going vessels to it. We had to do some dredging, but it was relatively minor, compared to what would have had to have been done if we had put it farther upstream.

HKS: Clayton tells a story that delighted him. Crown-Zellerbach was sending a ship, and you hadn't built a pier yet. You built a pier in two weeks. That may not have been you. I assumed it was.

RJG: Oh, yes.

HKS: And he said that was standard procedure. If you didn't need this decision making process, you had to build a pier, and you build it.

RJG: Things like this were a dime a dozen. They were always doing something like that. To build a simple wooden dock to tie up an ocean going ship to, that's easy. You don't need these elaborate docks [both laugh] to dock them.

HKS: Here's a map that I got from Zeb White. It shows Monte Dourado. Where was the pulp mill?

RJG: They don't show it, but it's here.

HKS: Oh, downstream.

RJG: Right here.

HKS: There's something in some of the articles I read. A town grew up across the river, and that's where all the gambling was, and so forth. Was there a pure town on one side and a corrupt town on the other, or what?

RJG: No. This is inevitable in Latin America, and probably any third world country. Whenever you have any kind of development, money coming into an area, you get satellite communities. It attracts people, and it seems to be impossible to prevent it. This was a slum that grew up across from Monte Dourado. It was in a swamp. We had high ground on the Monte Dourado side, and there's swamp on the other side. And this town was on stilts. The population of this town more or less grew with Monte Dourado. I never made an actual count, but they probably had twelve, fifteen thousand people there when we had twelve thousand people in Monte Dourado.

HKS: And what was the name of that town?

RJG: They call it the Beiradao. A translation of this is very difficult, but it denotes--it's typical of the Amazon, and there's probably nowhere else on earth like it. And it speaks to the size of the Amazon River and the immensity of the river's edge. The river's edge is called the beira, the edge of the river, beira de rio. And when you add d-a-o to it, you make it larger yet, immense.

HKS: I see.

RJG: Immense. The immensity of the endless edges of the rivers of the Amazon. This is really what it means.

HKS: So other than gambling and whatever, were there stores there where you could buy anything; you could buy a refrigerator across the river.

RJG: Yes, right. They grew up, so you could buy a refrigerator--

HKS: They'd sell you, plus markup. [laughs]

RJG: --buy anything you wanted. [both laugh]

HKS: Interesting. You talk about main roads and the railroad. Some journalist made a big deal out of Ludwig's obsession with the railroad, like he was--like he was at fault for having a railroad. So what do you think happened on the railroad. What's your story?

The Jari Railroad

RJG: The railroad. This was of course one of my major construction projects. The railroad was only feasible if the plantation went to five hundred thousand acres, which was Ludwig's ultimate plan. Five hundred thousand acres and twelve thousand tons a day of wood to get to the mill was unfeasible trucking it. It all had to come on one road to the port, at least for a portion of it, right? About twenty kilometers. So when Ludwig first mentioned a railroad, I laughed. [both laugh] A railroad [incredulously],

the way we're spread out like this? And I stopped laughing. I mean, he was dead serious about it. We're going to build a railroad, and--

HKS: So it was his idea originally that--

RJG: Yes.

HKS: Based upon this gut feeling he had?

RJG: Yes.

HKS: Why would he feel that way?

RJG: Just from what I'm telling you. He conceived things like this. Remember, Mr. Ludwig only had an eighth-grade education, but he could definitely see things that were obvious and that were practical, that made sense. He was intent on a five hundred thousand acre plantation, started at two fifty, but somewhere in there he jumped it up to five hundred. Then I had to agree. It didn't matter if I agreed or not. But I did agree. Five hundred thousand acres and then that volume. You had to move it with something other than trucks. In spite of our surfaced roads and all--and we kept them open through the rainy season by constantly blading them. We hauled on these roads for the worst times of the rainy season. Remember, we got a hundred inches a year of rain there. But those volumes really justified a railroad.

HKS: What did you know about building a railroad?

RJG: Building a railroad is not much different than building a road. We hired a consultant to give us the basic parameters, an outfit called T. K. Dyer near Boston. They were rail experts. They gave us, like I said, the basic parameters. Minimum radius of curvature for the railroad, superelevation, maximum adverse grade, maximum favorable grade, and then they designated the rolling stock, the size of the rail cars and the size of the locomotives, etc. We took it from there. We did the surveying and laid out the railroad in accordance with their parameters. It's not much different than building a road. To actually lay the track, I hired a guy--he happened to be an American from a manganese project just up the Amazon River from us. It was a Brazilian company, but they had retained this guy. He built the original railroad there for this manganese project, a couple of hundred kilometers of railroad.

HKS: This was Atunes.

RJG: It was Atunes, right, owned by Atunes. Ludwig's, quote good friend, unquote. (Atunes turned out to be anything but a good friend.)

I borrowed this guy from the Atunes project, and he ended up charging Ludwig a hell of a price for him. This guy organized the track laying crew and showed them how to lay track and did it. Now we did, like I said, all the grading and the drainage structures, and everything else on the railroad we did ourselves. It turned out to be an immense earthmoving project. The pulpwood had to come from the north and from the west, as you can see from this map, to Munguba (name of the place where the pulp

mill was built). Going to the west, the streams flowed north and south, so you were always going cross drainage. Then going to the north the streams flowed from west to east, so you were going cross drainage there, which lent itself to huge cuts and fills, because of the low grade requirements on the railroad. One and a half percent was the maximum favorable grade.

HKS: I understand why you choose the size of a locomotive. I thought railroad cars were standard size. Are they custom made, longer or shorter?

RJG: We were not allowed to use U.S. standard gauge. There are two standard gauges in Brazil, meter or narrow gauge, and meter sixty. We had to use meter sixty, standard Brazilian gauge. So they were built specially to begin with. And the railroad cars to haul the pulpwood were specially designed, as I remember.

HKS: I see.

RJG: There was nothing very unusual about them. The length of them was determined by how long the average or the longest piece of gmelina was going to be, this sort of thing.

HKS: And what do you show on a map? Details? Two main branches, then?

RJG: Right. One to the north and one to the west, right. We built forty-four kilometers of railroad.

HKS: So the locomotive goes in reverse in one direction pushing the empty cars.

RJG: Right. Diesel locomotives, they don't even know whether they're in forward or reverse. They don't care.

HKS: The maintenance for a diesel locomotive was no problem. You had access to engineers and spare parts. That sort of logistics had been worked out.

RJG: The railroad maintenance was relatively minor, you know, compared to everything else that had to be maintained at the pulp mill.

Airport and Kaolin Deposit

HKS: Is there something equivalent to the FAA in Brazil? You had to have certain standards for an airport?

RJG: The airport grew kind of with the project. Yes, to operate first the DC-3 and then, we eventually got an F-27, twin engine turbo-prop which carried forty to fifty passengers. There were minimum requirements for the length of the runway and airport to handle this type of aircraft, which we exceeded, I know. We did not pave the runway. It was, again, a laterite surface runway. And we had a huge hangar.

HKS: How far was the airport from the town?

RJG: The airport was about five, six kilometers from the town. There's a flat plateau about two hundred meters high above the river, a few kilometers from Monte Dourado, which happened to be the first area that was planted to gmelina. And the airport was up there. It is an excellent location for an airport. I remember we could have gotten a runway five thousand meters long if we needed it in that particular location. As it is, I guess the one we built was about two thousand meters long.

HKS: Most of the air traffic was with building?

RJG: Up to the time I left there was no commercial air traffic. Since I left, there are commercial flights into Monte Dourado. Everything was company plane up till the time I left.

HKS: But most of the flight was the relatively short flight down to Belém.

RJG: Three hundred miles.

HKS: The kaolin processing plant. You didn't know what kaolin was, but you described it as, what, slippery stuff? Or what is it?

RJG: The first place cleared is where the airport was, this flat plateau above Monte Dourado. The only stretch of road that was built when I got there, fifty feet or so below the top of the plateau in this road cut there was this very white clay. I wondered what it was. I thought it was unusual, but I didn't recognize it as anything valuable. Anyway, I mentioned it to someone. I forgot the details of this, but eventually one of Ludwig's geologists came out to look at it. He looked and said, That's kaolin. I said, What's kaolin? He said, Well, high grade kaolin is used in making paper. It's used to coat paper. Highest grade paper is coated with kaolin. He said, There's considerable use for it. This geologist then started looking at the size of this particular deposit and at other plateaus in the area. Across the river, to the east of Monte Dourado, in one plateau he discovered what turned out to be at the time the largest kaolin deposit in the world. This was a sideline to the forestry project. We developed this deposit. We opened up a mine over there and built a slurry pipeline from the mine across under the Jari River to the site of the pulp mill, which was also the site of the kaolin processing plant. The kaolin processing plant was built before the pulp mill. And we built the kaolin processing plant.

HKS: Then you shipped that out by barge, out to the world market?

RJG: Not barge but boat, ocean going ship.

HKS: Did the Brazilian paper industry use it?

RJG: No, it was almost all exported.

HKS: And it was very high quality.

RJG: Yes. Now for the construction of the kaolin processing plant, we did all the site preparation and the civil work, but this is one of the few things that was contracted out.

But the mechanical, electrical, structural steel, etc., was done by a major Brazilian contractor. The kaolin processing plant was built on site from the ground up, as opposed to the pulp mill, which, as you know, was built in the shipyard in Japan and towed to the site.

Owning the Land

HKS: Clayton talked a little bit about, and the press talks a little bit about the actual ownership of the property in first world terms, what Ludwig bought and what he actually owned. There were title conflicts and things like that.

RJG: Yeah:

HKS: Did that affect your job at all? A very valuable mineral deposit, would that ever have been a challenge to Ludwig's ownership?

RJG: I don't know if Ludwig realized what he was buying. The company that owned this property presented it to him as a solid block. They were politically powerful people that owned this company, especially in the State of Pará. But in reality it was a hodgepodge of individual titles with poor or nonexistent descriptions of the property boundaries. So that when you tried to plot this on a map, you had a bunch of overlapping properties along the rivers and you had a huge hole in the middle, because the properties didn't extend to the middle. This didn't bother anyone in the first years. It only became a problem when the project started attracting all this attention and the bad press. I mean the Brazilians jumped on this--he doesn't really own this land. Well, no one in the Amazon does. If you own along the river, you own what's inland from it, essentially, in the Amazon.

HKS: Did Ludwig pay royalties or taxes on the value or...?

RJG: That's a good question. I don't know.

HKS: I mean, there's a manganese mine, there's a bauxite mine, and...

RJG: Right. I never got involved in that. I don't really know if he paid royalties on the kaolin, for example. He never did develop the bauxite. Property taxes at that time in the Amazon were nonexistent. Since then, property taxes have become significant for anyone who owns land in the Amazon. For example, I own nine hundred hectares of Amazon land, which I just sold, and, like all good Amazon landowners, I have not paid my taxes. But I owe a considerable amount. I sold it to this individual, he realizes that the back taxes are owed on it.

HKS: I can see the public image suddenly in Rio. There's this billionaire not paying any taxes or any royalties.

RJG: Right.

Construction Projects

HKS: I have three more items under construction projects. I don't know the sequence. Do you want to leave the pulp mill until last? You also have the power line and the sawmill that's on, in there.

RJG: They're all together. The power line was just a minor project. I think it was a thirty three kilovolt or sixty six kilovolt line from the pulp mill to Monte Dourado, sixteen kilometers. It was no big deal.

HKS: Which way was the power going? To the mill?

RJG: No, it was going from the mill to Monte Dourado. You see, Monte Dourado was supplied with electric power by diesel generators until the pulp mill was built. And the pulp mill, which had a fifty-five megawatt generator, had enough power to supply Monte Dourado. We required maybe three megawatts at Monte Dourado. So by building this power line we were then able to shut down the diesel generators, which had been running for twelve years or so.

HKS: And diesel's pretty expensive.

RJG: We burned about twelve thousand liters a day of diesel fuel to supply power to Monte Dourado. Three thousand gallons, and it was very expensive, right. Caterpillar diesels, they're big ones, twelve and sixteen cylinder engines.

HKS: Another reason why it would have been better to have the town closer to the pulp mill.

RJG: Yes. Right. Another good reason.

HKS: And the sawmill was--

RJG: The sawmill was built along with the pulp mill. While it was a major project for us, it was part of that roughly seventy million dollars worth of onshore facilities that were built--onshore as opposed to what was built in the shipyard in Japan. That consisted of your wood handling facilities, all your conveyor belts, etc., the wood yard, and warehouse, and office building, chemical plants, and the sawmill. I mean, the sawmill was significant, but as a construction project it doesn't have to be separated from the pulp mill itself. It was right next to it. We did the site preparation, the concrete work. There was a Brazilian contractor, a major Brazilian construction company at the pulp mill, too, that did all the structural--again, structural steel, mechanical, electrical work. We did not do that.

HKS: But did you actually export any lumber, or was this for local construction primarily?

RJG: No. At the time it was the largest hardwood sawmill ever built in the tropics. The lumber was definitely for export.

HKS: Is that right? I didn't realize that.

RJG: Yes. And the objective was to export. This started well after the pulp mill and after I left.

HKS: Tell me about Clayton as a leader.

RJG: Clayton and I didn't get along too well at that time. Of course, he wasn't general manager that long. Like everyone else, he didn't last long in that position. I was hard nosed and stubborn, and so was he, with his religious beliefs. That was the only time we didn't get along. After he left, he came back to the U.S. and became a consultant. From then on we were allies all the way. Now we've both mellowed, and we're better friends than ever.

HKS: I try to imagine Clayton living in, what, the stereotype of a construction mentality--all these swashbuckling, hard-drinking, fistfighting type of guys...

RJG: But that's the thing. There were relatively few of them. I didn't have any. I had one other American engineer. All the others were Brazilians.

HKS: When you read the stereotype of the offshore American oil workers...

RJG: No, Ludwig had an American as an on site construction manager at the pulp mill, and he had an assistant, his American assistant, and then two other guys. There were four, four real construction types, American construction types, there, that was all, none of whom were part of my division.

HKS: So it wasn't anything like the people who drill for oil on the north shore of Alaska.

RJG: No.

HKS: Making big money and gambling and drinking and carrying on.

RJG: No [emphatically], not even close. Nothing like that. The Brazilians are drinkers and gamblers by nature anyway. [laughing] Ever seen carnival in Brazil? It's a party country. It may have seemed that way to Clayton.

HKS: So Clayton's wife Goldie was there. By the time you left, there'd be quite a few spouses there, because they had normal, by U.S. standards, houses and all the rest.

RJG: Housing for supervisory personnel of that nature was more than adequate.

The Pulp Mill

HKS: Let's talk about the pulp mill. That's one of the key figures in the whole story. At least it's portrayed that way.

RJG: Like I explained earlier, I don't think the decision was made to actually build a pulp mill until '74 or '75.

HKS: So the assumption was just shipping pulpwood by barge, how would you get it out of there? That was going out to the world market--that was actually the purpose of the forestry project initially, as far as you can determine.

RJG: No. It was never [emphasis] just pulp. It was pulp, lumber, and plywood initially. Because of the rate at which gmelina was expected to grow. Ludwig was envisioning at that time, at the beginning, gmelina that big [gestures] in diameter after ten years.

HKS: Twenty inches or something.

RJG: Yes. Some of which would be suitable for peeler logs.

HKS: I didn't realize that. I thought it was only pulp.

RJG: No. Then after it became obvious that the gmelina wasn't going to grow to that diameter in ten years, no one ever talked about plywood again. There was still talk of saw timber, lumber, but gradually the shift went to pulp and paper, high grade paper. I guess gmelina apparently tested very well for making high grade paper. Here I'm talking in a field I don't know anything about, but this is my understanding. So that eventually the industrialization of the project turned entirely to pulp and high grade paper, with the sawmill to saw the tropical hardwoods that would be cut to expand the plantation and to supply fuelwood to the generator of the pulp mill.

HKS: The sawmill we're talking about, this may not be the one that Clayton was talking about, but that was one of the few battles he lost. It was a huge sawmill. It was never efficient. It may not be the same mill we're talking about.

RJG: No, I'm pretty sure it is. It's the hardwood sawmill built at the pulp mill.

HKS: Cutting, obviously, the local logs.

RJG: Right. Unfortunately I left shortly after it went into operation. I watched them saw a few times when they were just starting it up. I don't have any information on how that turned out.

HKS: So the pulp mill, obviously, is a defined thing. You need the labor force, transportation systems--

RJG: Oh, listen, let me give you the economics of the Jari project in a form that probably no one has ever given it to you in.

HKS: O.K.

RJG: When this scenario developed I'm not sure, but it was definitely in the later years and while the pulp mill was under construction. The project was only feasible,

essentially, with two pulp mills; the first one that was built and another one next to it. These two pulp mills would supply a high grade paper mill which would produce an income of six hundred thousand dollars a day. Only then would all expenses be covered and the vast infrastructure you had to maintain be covered and the project be viable. Six hundred thousand dollars a day is what had to be generated in income. The pulp mill, and I'm not sure if that involved a second pulp mill or not, because too many years have gone by. It may not have. It may have been just the existing pulp mill plus the high grade paper mill next to it. Now that involved another billion dollar investment. It was four hundred million roughly for the paper mill and six hundred million for the hydroproject necessary to supply the approximately three hundred megawatts that the paper mill would consume. It was another billion dollar investment to get to that point.

HKS: At one point this was on the drawing boards, and, presumably, Ludwig would continue to invest, and add the second mill and hydropower and all the rest?

RJG: Definitely. That was the ultimate project. That was his goal. What killed the project was the government, the Brazilian government, not allowing him to build the hydroproject, because of this bad publicity and the general feeling in the country of Brazil against the project. Without the hydroproject, he couldn't put in the paper mill, and without the paper mill the project was not viable. So he was faced with operating the existing pulp mill at a loss forever, or giving the project away. And so he gave it away.

HKS: So the hydropower primarily was to run the mill. There wasn't a local market for electricity then.

RJG: Exclusively for the paper mill. Apparently these things require vast amounts of power. I've never even been in one myself. We did all the preliminary work, in conjunction with Alcoa, for the hydroproject. We knew the potential that was there and even the size of the reservoir had been determined and the location of the dam, etc.

HKS: When you make paper you have to dry it. I imagine that's where most of your energy goes, the drying of the paper.

RJG: Probably.

HKS: Talk about the pulp mill. Obviously, to the amateur engineer like myself, you want to make sure the foundation is the same size as the thing that floats in, so you put it on there and it matches up.

RJG: O.K. The pulp mill was designed and built probably like no other on earth before or since. The concept of the pulp mill was not only for this pulp mill. The concept that Ludwig came up with was really for a method to build efficiently and cheaply in remote locations in developing countries. By building the pulp mill in a shipyard in Japan and towing it to the site, you eliminated having to have a very highly skilled construction work force on site, and the logistical problem of getting all those individual materials to the site. Ludwig envisioned this method of construction being used indefinitely.

HKS: I see.

RJG: Saudi Arabia needs a desalinization plant in the remotest corner of their kingdom, or maybe I should use a country like Afghanistan. Rather than try and build it on site, you build it in a shipyard in Japan or wherever, and you tow it to the site and plug it in and start it up.

HKS: It's all a mystery for me, what was the route they towed the pulp mill? Across the Pacific, around the Horn? Or-around Cape Horn?

RJG: Around Africa.

HKS: O.K.

RJG: The distance was about the same, but I guess going around South America, the weather is so bad and the sea so violent that there was really no choice. Coming around Cape Horn was much safer.

HKS: How long was it at sea?

RJG: It was at sea about two months. They were called platforms, industrial platforms, to dispel the image of it being a pulp mill on a barge. The entire structure was a pulp mill, and it was designed to float. But it was a pulp mill, it wasn't anything else. Then when you got it to the site and put it on the pile foundations, you cut all kinds of holes in it to run your pipes and wiring and whatever else you needed to run into it.

HKS: Of course, otherwise you'd have a tough time unloading it from a barge.

RJG: Exactly. Do you understand how it was done, how it was put in place? First, there were two platforms that made up the so-called pulp mill. One was the pulp mill itself and the other was the power generation unit and, I guess, the recovery boiler. Each of these platforms weighed about forty thousand tons. They were eight or nine hundred feet long, a hundred fifty wide or so. In other words, the size of good large ocean going ships. They were built in the shipyard in Japan and floated and towed around Cape Horn, thirteen thousand miles or so. Each one was pulled by a twenty-five thousand horsepower tug. The main business of these tugs was towing offshore oil drilling platforms, for oil companies around the world. That's why these tugs even existed. While the mills were being built in Japan, we were preparing the foundations for them on site. The foundations for each platform were about eighteen hundred wood piles of a very rot resistant Amazon hardwood.

This was obviously a major pile driving project, eighteen hundred piles for each platform and the average length of the piles was--I keep mixing metric and English systems. Let me keep it in metric. It was about fifteen meters, thirteen to fifteen meters. The longest ones were about thirty meters. They had to be spliced. The platforms were designed simply to be floated over these piles and sit on them. There was no physical connection. They were not bolted to the piles or anything like that.

HKS: So you float them in at high water time?

RJG: I'll get to that.

HKS: O.K.

RJG: How to float them over. All we did was, we had to line the piles up. We had a very elaborate location drawing of the piles, because they had to set under the structural members of the platform, obviously.

HKS: Sure.

RJG: And we followed this. And the piles had to be cut off at exactly the same elevation, with about a plus or a minus three millimeter tolerance. Then on top of each pile was--a two inch thick neoprene pad was placed, which was the actual thing that the steel of the platform sat on. Now, to get the platforms over the piles, we diked the entire area. We built a dike around the entire area where the platforms would sit. To one side of this dike we dredged a channel in from the Jari River. It was dredged. So we had a channel in from the river, and then we had what was called a berthing basin, which was an area wide enough for the two platforms to float, side by side.

The platforms got there and we guided them into the berthing basin. Then we had to close off the river and this channel, and bring that opening up to the height of the dike we had already built around the whole thing, right? Around the berthing basin and the piles. Closing off the river, which was a technically challenging job, to say the least, and all this was done in the rainy season with earthmoving equipment we had there. The dredge has an amazingly large pump, and it's a high volume, low head pump. With pipe from the dredge we put pipe over the dike from the dredge, right? The dredge simply started pumping water from the Jari River into this now completely enclosed basin which includes the piles. We raised the level of the water about seven meters, exactly twenty-three feet in this case, so that the platforms could now float over the piles. We had built substantial wooden bunkers for the platforms to butt against, so that we were sure that they were in exactly the right position.

Floating them over the pilings would have been relatively easy in a calm bay, but we had wind that day, and it was a heck of a job to get them in position. But, very simply, once they were in position against these massive wood bunkers we had built, then all we did was open a forty-eight inch valve that we'd installed under the dike and let the water drain out, and the platforms simply sat down on the piles. No connection whatsoever between the platform and the pile, which is where they sit today.

HKS: So a five hundred year flood would never wash it off, or something?

RJG: No.

HKS: What was the technically most challenging part of that whole thing, other than the sheer magnitude of the job? Getting all the piles cut to the same height, or what?

RJG: No, that was relatively easy. It was done with chainsaws, and we just rigged up a device which would be bolted to the pile to secure the chainsaw, and then you could

raise or lower it with a level, a surveyor's level, so that it was in the right position. That turned out to be relatively easy. The river closure was extremely difficult. We couldn't wait till the dry season, that would have meant another six month delay. But it went well--we had stockpiled the right material to close off the river. It was a sandy material, which we could handle relatively easily in spite of the rain.

HKS: How long were the pulp mills in construction in Japan? A year? Two years?

RJG: About a year and a half. We did site preparation in early '76, end of '75, early '76. April of '78 is when we floated the platforms over the piles. The pulp mill went into operation approximately a year later, roughly April '79. From the beginning of site preparation to the end, it's three years and four months.

HKS: And meantime you were--

RJG: It was two years and four months from the beginning of site preparation till we had the platforms in place. After the platforms were in place, the rest of it was hooking up.

HKS: Were any of the engineering problems you faced unique, had never been tried before?

RJG: It may have been the largest wood piling project of all time, for one thing. Each individual operation was probably not unique, building the dike around the piling, and digging the channel in. But the sequence had probably never been done before. All these different operations had never been for this particular purpose of getting a pulp mill in--two forty thousand ton industrial platforms, which were a pulp mill, into place.

HKS: Was Ludwig a help or a hindrance during all this? Was his fertile mind throwing out ideas or was he fascinated by this stage?

RJG: Well, at that time during the construction of the mill, he visited the project about every three months, and he would stay four or five days each time. Was he a help or a hindrance? A help, to me. His imagination was fertile, he came up with any number of ideas, and some had merit and many didn't. He was the type of person that, just because he got the idea, if you could show him it was not a good idea, he wasn't stubborn about it. He'd accept it. He'd say, O.K., you're right. When he did come up with a good idea, and you realized it was a good idea, I mean, you really ran with it.

HKS: What we read about how the Egyptians made pyramids, these engineering feats of primitive societies are rather impressive. You had a lot of labor, a lot of time. Building that mill, putting it on site and having the pilings all lined up, the coordination between you and Japan--probably some of those things that seem hard were pretty simple. I mean, once they had the blueprints to build the pulp mill, you knew where the structural support was going to be. So you knew where the piling had to be, and it didn't come in two feet longer than advertised, or something.

RJG: Exactly. We did our part, and they, the Japanese did their part. One of the most difficult jobs was the actual berthing of the platforms. It was done with our people and

our equipment, but the Japanese actually supervised it. Some Japanese came over on the barges just to watch it, and then there were a number, quite a few Japanese on site. A lot of these Japanese didn't speak English, and of course none of them spoke Portuguese, and none of the Brazilians spoke English or Japanese. And [laughs] none of us spoke all three languages. It was very interesting when those platforms arrived, and you had these Japanese seamen shouting to me, giving me orders, and I was supposed to translate, but they couldn't speak English. But anyway, we got through it, because we pretty well knew what we had to do.

HKS: There wasn't the problem that you read about in Japan, where the need to save face is so great--this is a stereotype, now--to save face is so great, that mistakes are allowed to happen, because you don't want to criticize someone. But that wasn't a problem you had?

RJG: No. No. That wasn't.

HKS: Just ordinary communications.

RJG: It was only for that particular operation, because most of your Japanese supervisory personnel did speak English. If I needed to, they could speak English to me, and I could, of course, translate into Portuguese to my supervisors.

HKS: Clayton talked about the Finnish technological help in getting the mill up and running. Were the Finns involved in that early stage right there when you were putting it on the piers?

RJG: No. The Finns only came when it was a few months before it was about to go into operation. The Finns weren't there, and they didn't need to be there for the major part of the construction. I personally had very little contact with the Finns. I mean, I didn't need to, it was between them and the Brazilians that were going to run the mill. And the foresters, of course. Forestry.

HKS: Did you have the road system in, the railroad, everything was ready to go by the time the mill.... They threw the switch on the mill, the wood was coming in?

RJG: Oh, absolutely. Right. I mean that was my major responsibility. I had to have the towns built, the roads and the railroads ready as well as the mill. That was all crucial, of course. We pulled this off, we were able to do it.

HKS: With the kind of financing that Ludwig would manage for this, were you under pressure to not get things ready too soon, because you had capital invested that wasn't generating income?

RJG: No, there was never any worry about getting something done too soon. [laughs] You were always trying to get it done on time. His inception of the project, planting gmelina in the Amazon, I mean logically he would have experimented for ten or fifteen years before actually going into the planting on a large scale. But he was seventy years old at the time. He didn't have time for it.

HKS: Sure.

RJG: So he made assumptions, the assumption being the gmelina would grow. [laughs]

Leaving Jari

HKS: How soon after the mill was up and running did you leave?

RJG: I left in October of '80. So the mill was in operation a year and a half when I left.

HKS: I see.

RJG: Actually at that point, construction was finished. We had expanded the railroad farther north, and that was our last major project. There were no other major construction projects envisioned at that time. At that time the pressure from the Brazilian press and the public against the project was immense. I made the very difficult decision of leaving, kind of getting out while the getting was good, because I saw what was coming. An opportunity came up with Alcoa. Alcoa was about to invest a billion dollars in an aluminum smelter and a bauxite refinery in the city of São Luís, to the east of Belém. And I hired on with them as a--

HKS: Oh, I didn't realize Alcoa was in Brazil.

RJG: Alcoa's big in Brazil. I went through the Pittsburgh office when I hired and when I left, and that's all I saw of the Pittsburgh office.

HKS: But, as it turned out, you were just about out of a job anyway. Construction, of the magnitude you were involved with, more or less stopped when the mill got going?

RJG: I could have hung on. But, personally, I could not have taken it. With the Brazilians coming in with their pompous attitude and taking over the project, and with my temperament, I could not have taken it. Johan stayed to the bitter end. I could not have done it. I mean, I would have--I would have shot somebody or got shot myself.

HKS: I see.

RJG: To this day I remain extremely bitter about the way that the project was taken from Mr. Ludwig. He invested a billion dollars in the project, he put forty thousand people directly to work--well, let me back up a minute--about seven thousand people directly to work, and forty thousand people indirectly, and was the major contributor to the economy of northern Brazil, and particularly the State of Pará. And then to kick him out like they did, and never invest another dollar of their own, just take it from him like they did--I remain bitter to this day. I haven't gone back to the project since I left, and that's because I made a promise to myself, which I may not keep forever. I said, [laughs] The only way I'll go back is at the head of a mercenary army, to take it back.

HKS: There'd be headlines there, too. So you could have stayed on as an employee of the overall program, so far as you--

RJG: For another year or so.

HKS: O.K.

RJG: Kind of like Johan did, but--and then he was forced out, as the Brazilians took over.

Ownership Transfer

HKS: What more to the story is there?

RJG: First of all the economics of it. It's probably not been put, in the form I've given it to you, that magic number of six hundred thousand dollars a day, which would have made the project viable. All this presumes the success of the forestry aspect of the project, in other words, that the trees grew and provided the volumes necessary to keep this mill running and the paper mill. That part--I remain--is a big question mark in my mind even to this day.

HKS: Everything you read is suspect, that the mill had to import about fifteen percent of its wood. Only eighty-five percent came from his plantations. Does that ring true to you?

RJG: I don't know. And I don't know how much was bought outside, how much came from Atunes' plantations near the manganese mine. Apparently he planted large areas of tropical savannah to eucalyptus or pine, I'm not sure which. I don't know what came from there. I know that in the '80s there, that Jari was buying pulpwood from producers along the banks of the Amazon River. I don't know what the situation is now.

HKS: You said earlier that Atunes turned out not to be Ludwig's friend after all. Do you want to comment on that?

RJG: Atunes was kind of a Ludwig of Brazil, and, being a wealthy man I think Mr. Ludwig--I always had this impression that Mr. Ludwig considered him a friend and someone that could be trusted. Atunes, the way I see it, was instrumental in getting the government to force Ludwig out, and to give the thing mainly to him.

HKS: So he benefited directly from what happened.

RJG: To say the least. Right. To say the least.

HKS: What actually happened is not clearly covered in articles.

RJG: I can't swear to this, because I don't know either, but I'm ninety-nine percent sure that this has happened. He, Atunes turned out to be what you can only--what's

only expressed well in Portuguese, *um amigo da onça*. It translates, friend of the jaguar, but it means a friend who's not a friend but an enemy.

HKS: I see. Yes. How about the other programs, like agriculture, the growing of beef and rice, and all that? Were you involved in those sorts of things?

RJG: I wasn't involved with them, but basically when Ludwig bought the property, he not only bought that Brazil nut business I mentioned, which he never ran. He got the riverboats out of it and discontinued the Brazil nut business, but he also bought a herd of cattle. The herd of cattle was maintained to supply meat to the project. It was cattle and water buffalo. It was never meant to be commercialized. What's called the agricultural project was an attempt to grow rice commercially in the lowlands along the Amazon River. And many millions were spent on this. It was a separate project, physically, a hundred kilometers or so from the forestry project.

HKS: I hadn't realized it was that far away.

RJG: Yeah, that far away. The investment was nothing compared to the forestry project, but nonetheless it was many millions of dollars, tens of millions.

HKS: But was that rice for food? I thought it was rice for fuel.

RJG: No, it was rice for food, to sell. It was just not viable, and it was eventually discontinued, or when the Brazilians took over the project, they discontinued it. I'm not sure which.

HKS: O.K.

RJG: Anyway, it was a significant investment, you know, part of the six hundred million of his own money that Mr. Ludwig invested.

HKS: There's a market for rice in Brazil itself, I would assume.

RJG: Right.

Consultants

HKS: You've mentioned several times he used consultants. He brought someone in helping with the railroad, the technical aspects of railroading. You saw consultants as something very positive in your experience. Clayton said consultants just rained on him. This is the way he described it, Ludwig was always sending consultants down.

RJG: I can understand in the forestry aspect of it, right, he was always--Ludwig was always sending someone to second guess you. For every one I had to deal with second guessing me, the forester, either Clayton or Zweede, had ten to contend with. I had my problems with consultants he sent there, because people started second guessing me.

HKS: That was just Ludwig's choice? Why did he decide that forestry needed that help, and not the engineering part?

RJG: It took many years for me to gain Mr. Ludwig's confidence. However, once you had his confidence he gave you relatively free rein.

HKS: I see.

RJG: Like I explained before, I kind of grew with the project. We started out as a very small construction project. I grew with it. I was only twenty-nine when I hired on with Ludwig, and he was seventy. My age was against me, and also the fact that I had a college degree was against me. He had contempt, really, for people with college degrees, although he recognized that certain things required it. High tech engineering, he knew that you couldn't build a rocket to the moon or jet aircraft without engineers. But he still had contempt for people with degrees.

But I had my share of consultants, and, for example, just take simple dirt moving, right? I would order, or put in the budget, the heavy construction equipment I needed to do what had to be done, the grading for the railroad, the building of the main road system, etc. And I'd get a consultant or someone that Ludwig would hire and come down and say, What do you want that for? In California we don't use Cat 631s, we use 651s. You get a lot more production. You said, Well, maybe that's how you do in California, but here in the middle of the Amazon it won't work. And I was fending off stuff like that all the time, too. Don't get me wrong. But I, you know, I generally managed to prevail.

Equipment Management

HKS: How long does a piece of heavy equipment last when it's used a lot?

RJG: We went through two complete sets of heavy construction equipment in the thirteen years I was there.

HKS: So you originally started with D-8s and D-9s, and you downsized?

RJG: The D-8s and 9s continued, except that we no longer used them in clearing. They all eventually were used in construction. The only thing we really upgraded was, we started out with a relatively small type of earthmover, a scraper, for moving dirt, and we upgraded one size on the next go around with them. About the time we were getting into real heavy earthmoving, where Caterpillar could not deliver on time, they were swamped with orders and we had to switch to Terrex, which was really kind of inferior, somewhat inferior to Caterpillar, but nonetheless they got the job done. More than anything I was second guessed on the type of equipment that I wanted, because Ludwig was fascinated by equipment, and especially exotic equipment.

HKS: Did salesmen come down? Seems like you were a pretty good market.

RJG: No. No. Because of the remoteness of the project, and the only feasible way to get there was by company plane. A salesman could have hired an air taxi in Belém and flown out there, but he gets there and he's on his own. He's got no car, no nothing.

HKS: I realize there's all sorts of technical specs that are published about equipment. But how did you gain your experience, so that, when you wanted to make a shift in the technology, that you knew the new equipment was going to do something better than the old equipment?

RJG: I didn't really require any exotic equipment. It was standard earthmoving equipment.

HKS: O.K.

More on Ludwig

RJG: Bulldozers, and scrapers, and hydraulic excavators, and compactors, and off-highway dump trucks. For the rock quarry, I went to the best equipment--Gardner-Denver compressors and drills, and the rock crusher. Ludwig and I went through a long process on that before we finally got a rock crusher that I needed to do the job.

For example, Ludwig wrote to me. He's telling me that I'm becoming overworked and they're asking too much of me, so he's decided to divide the engineering construction division into two parts, where I would be responsible for heavy construction and someone else would be responsible for residential and lighter construction. It never came about. [laughs] Nothing ever came of this.

HKS: He didn't do that as a way of demoting you.

RJG: No.

HKS: He would tell you point blank, right? He wasn't shy.

RJG: Oh, would he ever! Ludwig could be ruthless. There were several times where, with two general managers in particular, that he interviewed and sent to the project to be general manager and I was reporting to them, forestry was reporting to them, and maintenance. And the first time he comes to visit the project, he treated these guys like dirt. I mean, right in front of us, he would ignore them. We were at a meeting, right? These poor guys would try and talk to him, and he wouldn't even talk to them. He'd talk to me if it was about construction, or Johan if it was about forestry. He just got turned off by these guys, something they had said or some wishy-washiness that he noted. He could be ruthless in that respect.

HKS: But Clayton somehow had the chemistry when he was general manager, it worked--he actually worked through Clayton? Or was that after your time?

RJG: Clayton, maybe he didn't quite admit it, but as general manager, he was fired. He was kind of kicked upstairs, you might say. Yeah, he was one of the few that was not fired.

On the other hand, Ludwig could be very understanding. He was very understanding when it came to something like illness, especially serious illness. I don't know why he

was so concerned about cancer, but you probably know that he donated most of his wealth, he formed the Ludwig Cancer Foundation, which is today administered by a group he designated. But he was very understanding about something like this, and he would intervene personally. My mother got cancer in '77, and the local doctors in the local hospital couldn't do anything for her.

HKS: She was in the States.

RJG: My mother was in the States, right.

HKS: O.K.

RJG: So it's the one time I talked to Ludwig that was not about business. I called Mr. Ludwig from Monte Dourado, and I said, Mr. Ludwig, my mother has cancer, and the local doctors can't do anything. I wonder if you could get her into the Mayo Clinic. I always choke up when I tell this story. But at that time, I think there was like a six month waiting list to get into the Mayo Clinic, and she was in there within a week.

HKS: Interesting.

RJG: I never heard the results of her stay. I didn't hear until the next time that Mr. Ludwig visited the project. He just said, Bob, you know, you only get one chance with cancer. And that's about all he said. I knew that at that point it was just too late.

HKS: He called you Bob? Did he generally use first names with people?

RJG: I was Gilvary until I gained his confidence.

HKS: I see. He's certainly a fascinating guy, and the U.S. press had a lot of fun stereotyping him as being a reclusive.

RJG: He was not reclusive at all. Comparing him to Howard Hughes, for example, is ridiculous. Howard Hughes hid--you couldn't see him personally. Ludwig was not reclusive. If it concerned business, he'd go anywhere, talk to anyone. He just didn't want any extraneous activity, like reporters or salesmen, or that, getting near him. Like I said, he visited the project every three months during the peak construction of the pulp mill. He flew--initially he flew tourist class, and that's another one of his aspects. He would not waste money. Then in later years, when his back was bothering him real bad, he switched to first class.

HKS: O.K.

RJG: He'd fly Varig from New York to Belém, or Miami to Belém.

HKS: When you took him out on the construction site, in undeveloped areas, he'd sit there leaning against a pickup truck and eat a sandwich? He didn't need any special food or catered...?

RJG: No, none whatsoever.

HKS: He got a little dirty and that was all right with him. He didn't worry about that.

RJG: Yes.

HKS: He didn't come out with a suit and tie on, like this?

RJG: [laughs] Never. Never. He dressed just as casually as could be. If he wanted to go to the rock crusher, he'd say, O.K., Gilvary, let's go out to the rock crusher. He'd hop in my pickup, and we'd bounce out to the rock crusher.

HKS: You said earlier you felt he was spending seventy-five percent of his time on the Jari project.

RJG: Yes.

HKS: Because he really got fascinated with it, apparently.

RJG: Well, fascinated, and it became far and away his major investment. I mean, even though he had something like, at that time, about ninety companies around the world, this is by far the biggest project, the biggest undertaking of his life.

HKS: Sure.

RJG: It had to be. Six hundred million of his own money, a billion total invested.

HKS: It's amazing. The photos. You've shown me a couple. Is there something else they remind you of?

RJG: O.K., there's something that'll interest you. These are some of the original construction camp barracks. When I first got to the tropics and the rain forest, I wondered why all the trees were cleared in such a hot climate. Why didn't you leave some of the trees for shade? And then one night this happened, and I saw why. Because tropical rain forest trees are close together, and they're shallow rooted. And you remove the intermediate ones, and you're just about guaranteeing that the ones that remain are going to blow over.

HKS: So it was wind, just ordinary wind. It wasn't a hurricane or something?

RJG: Just an ordinary rainstorm. You typically got fairly strong winds before a rainstorm in the rainy season. This was the first year of the project. From then on, anything we built we cleared all the native trees first. You just couldn't risk it.

HKS: Same way along the road right of ways, because they'd fall across the road?

RJG: Yes, they would fall across the road, but most of the roads eventually went through plantations anyway. So it didn't really matter, the width of the clearing didn't matter that much. It was all planted.

HKS: That looks like hurricane Fran.

RJG: And no one was killed. This happened on a weekend, and all the men were over on the other side of the river, having--

HKS: Having a good time.

RJG: Having a good time. It was Saturday night. [showing pictures] That was the then governor of the State of Pará. That's the Brazilian engineer that was there when I got there and left a few months later.

HKS: Do you have any of Ludwig?

RJG: I don't think I have any.

Wildlife and Hunting

RJG: This is my cat that I raised. Let me show you the picture of my cat. I kept him for eleven years.

HKS: Is that right?

RJG: I bought him off a hunter, who trapped his mother for her skin and caught him in the trap, and he was too small. He was going to sell him in Belém. I met him coming down the river, and I bought it from him, and I kept it for eleven years.

HKS: Which cat is this, then?

RJG: Jaguar.

HKS: It is jaguar.

RJG: Yes. Third largest of the world's cats.

HKS: And I see he's in a cage.

RJG: The cage I built for him.

HKS: But basically tame.

RJG: I kept him as mean as possible. I loved to see him be himself. Instead of trying to make him what he's not, like animals in zoos and people tend to do with animals, I let him be himself. And that's what I enjoyed about him. One thing that kept him so healthy. In spite of the fact that I fed him, he hated me, because I'd take a big stick, and I'd poke him with it, and it would infuriate him. It would give him the exercise that he needed, that he wouldn't get, to keep himself healthy.

HKS: How common--

RJG: How common?

HKS: Did you see them in the wild?

RJG: I killed five.

HKS: Why?

RJG: I'm an avid hunter. I don't know how you feel about hunting.

HKS: Clayton's story is the reverse. He almost never saw wildlife.

RJG: That's because Clayton was never off in the jungle hunting.

HKS: I see.

RJG: It's not that you just walked into the woods and you were seeing wildlife. You had to put in a lot of hours. But I hunted every Sunday, all day long, for almost the whole time I was there. Of course, we worked on Saturdays, but even if I could get away on Saturday for the afternoon, I would, over the years. This is, this here is one--the list of the animals I killed over the years.

HKS: Did you have trophies made?

RJG: No, I never had any trophies made. The jaguar skins, I had them tanned, but they rotted anyway. The only one that's missing is '79. It's all in Portuguese, but that's a jaguar, that's the white lipped peccary, that's the collared peccary, the red deer, the white deer--that's a little deer, he's really tan. Tapir. This one here is a delicious eating rodent. A bunch of birds. And then, to feed the jaguar, I used to kill monkeys. He ate a monkey every two days.

HKS: Wow. I suppose--

RJG: About a twenty pound monkey every two days. Fifteen, twenty pound monkey. Are you a hunter? I took a few people hunting with me over the years.

HKS: It's attractive for some people.

RJG: One guy I took was Loren McIntyre of *National Geographic*. I took him on an all day hunt. He wanted to film especially this white lipped peccary. It's not a wild boar, like the European wild boar. It's a smaller animal. There's two types, the collared and the white lipped. The white lipped peccary, they average about sixty pounds, and they run in huge herds of, like, twenty to three hundred. And it's the most impressive thing in the jungle, a large herd of them. You see three hundred of these animals en masse in the jungle, and it's something you'll never forget. They're very noisy.

HKS: There's peccaries in the American Southwest.

RJG: That's right. They come--that's the northern extent of their range. It's the collared peccary, the smaller of the two, and they only run in small bands of like three to ten or twelve. Anyway, I took Loren on this all day hunt and we didn't see a thing that day, which is not that unusual.

Life in Monte Dourado

HKS: Was your family there when you were there, with you?

RJG: I have been married a few times. Darlinda and I have been together now for over fifteen years. It just took me a long time to find the right woman. But I married a Portuguese girl there in the second year of the project, and then we got divorced around, toward the end of the project. And then I met Darlinda at that time and we got married shortly after. You probably never heard about the Jari basketball team. [still looking at photos]

HKS: No.

RJG: Here we are. There's two different groups, but--

HKS: You write about a fifty-five room school. That's a lot of rooms, for the population.

RJG: We designed the school so that it was just a covered walkway and individual classrooms, so that it was infinitely expandable. We started with three classrooms, and we ended up with about what you're saying.

HKS: They taught normal curriculum for Brazilians.

RJG: Yes.

HKS: First, second, third, fourth grades, and so forth, for the kids.

RJG: Right. Up to high school.

HKS: And they played basketball.

RJG: Right.

HKS: But you're a long ways from the next town.

RJG: We had teams come out from Belém to play us. I mean, this was a big event. They generally beat us, because they were semi-professional teams. There's me, that's my American--my one American engineer, and that guy is American, and the others are Brazilians. We had a complete mix, Americans and Brazilians. Mostly Brazilians, of course. Brazilians are very good at sports. I'm surprised they don't do better in the Olympics.

I have very few pictures of actual construction. [showing photos] We're building a new water tower in Monte Dourado. There I am at the pulp mill with--that guy there was a consultant.

HKS: Hard hats optional, I see? Some people have them, some people don't.

RJG: Completely optional. I was not safety conscious. Some of these aren't even--oh, I really don't have good pictures. There's our concrete house building system. There's the aluminum forms, the little bit of rebar in the wall, four inch walls. We built about three thousand houses like this. This was a two bedroom house for foremen level people.

HKS: Now this is a twelve thousand population town?

RJG: Yes.

HKS: A roughly equal mix of men and women and kids and all the rest? Or is this a male dominated society?

RJG: Toward the end there it was, it was evening out. I mean, there were no women to begin with, and then toward the end it was mostly families. There were roughly equal numbers of men and women.

HKS: There's Ludwig when he was younger.

RJG: Yep.

HKS: I've never seen that one.

RJG: That's right. That's a relatively rare one.

HKS: I have some of those, but none of the originals. So that's--that's half of it?

RJG: That is the pulp mill itself. There's the two together. Here, here you go. You can imagine this much better, what I described to you. The only thing that's not shown here is the dike. You see, this was the berthing basin--

HKS: O.K.

RJG: --where these platforms set. Here is the channel out to the river. This of course is the Jari River.

HKS: O.K.

RJG: Oh, and I think this is even part of the dike. We diked around this whole thing, here, like this, leaving only, of course, the channel out to the river to close off after this platform and this platform were docked here. And then we raised the water twenty-three feet, floated them over the pile foundations. I think you can get a much better picture.

HKS: All this housing, that's part of the--

RJG: This was another community that sprang up, much smaller, in front of the pulp mill. But since there was no town here, you know, this didn't grow much more than you see it here.

HKS: Here's the basketball team.

RJG: An article about my basketball team, about me hunting in the jungle. The local paper from where I came from--my dad instigated that. Most of it is just articles taken here and there about Ludwig over the years. I mean, you're certainly welcome to look through this and see if there's anything that might interest you.

HKS: Well, I don't know how well they would copy. What I need to do is probably get the originals.

RJG: Yeah, right.

HKS: Ah, now, obviously Jari did not have a press agent who handed out photographs. Where did those aerial photographs come from? Was that part of the infrastructure getting installed? Or is that the press taking these shots here?

RJG: That was, that was the press. I'm not sure who. I'm not sure who took these pictures. But it was the press. Here's something of a few weeks ago. The corner of the power platform settled considerably. About a month ago Johan calls me, and he says, One of the--the corner of the pulp mill there, the power platform's settled, and the on site engineer wants to talk to you. He said, I gave him your number. When I hang up, he'll be calling you. And he did. He called. It's the first contact I've had with anyone there since I left.

The guy explained what happened. These things weigh forty thousand tons each. Over the years, they had stuff spilling inside that power platform, and accumulating, and it accumulated and accumulated until they estimated it weighed about twenty thousand tons. Fifty percent more than it was designed for. And at the same time, this was caustic material. It was also spilling outside of the platform, around the piles, and the caustic material was causing the wood to deteriorate. Where the wood was not in contact with this caustic material, it was still perfect.

We talked about it. I explained to him what the piles were designed for, fifty tons each, and we tested them to two hundred tons. But they had already hit on what the problem was. The problem was first of all the excess weight, and then second the caustic material causing the deterioration of the piles. So what they did is they fitted sections of steel pipe over the piles. They kind of solved the problem themselves, but they wanted to know what, something about what the original design was.

HKS: This spilling of caustic materials wouldn't happen in the States, probably, because of environmental--

RJG: Absolutely not. I don't know if you have any experience in third world countries?

HKS: Almost none.

RJG: The main reason they're third world countries is not because they don't have excellent laws on the books. What makes them a third world country is the lack of enforcement of the laws, either because of politics or simple inability to do it, or just not caring. Brazil perhaps in particular will proudly point out to you their environmental laws and their constitution. It's a farce. It means nothing. There is no enforcement.

HKS: Is bribery an issue?

RJG: Bribery is always an issue. Always an issue. But mainly, no one gets out to see what's really going on. You're aware of why tropical rainforests are disappearing around the world, and it has nothing to do with the logging and sawmilling and pulp mills or whatever. It's simply population explosion and clearing for subsistence agriculture.

HKS: Did you deal directly with Brazilian officials routinely on your job?

RJG: No, no one was inspecting us. I dealt considerably with the navy, because anything that you do along a navigable waterway must be approved by the navy. And we were sure that we got that approval.

HKS: The navy had expertise on its payroll, rather than sailors?

RJG: They had a couple of guys that weren't too bad. They had to approve. We'd submit the permanent dock we built for the pulp mill. Temporary dock you didn't have to worry about. You'd just tell them about it. It's a temporary dock. It's going to be timber piling and then we'll remove it. The permanent dock you had to get approval for. This is where we're going to ship our pulp from. Navigation buoys in the Jari River, in the stretches that we dredged, we had to have the buoys approved, and their location approved.

HKS: In the States the Corps of Engineers provide the same kind of function.

RJG: Right. Exactly. Then the same thing for the airport and our radio that had to be approved by the equivalent of the FAA. They were bugging us all the time. There were many complaints because of speaking English on the radio.

HKS: Was this pretty simple? Was it slow? Where there a lot of delays, fiddling around? Or was it efficient in getting inspected and located?

RJG: Oh, you had to struggle and wait, being a foreign company. Sometimes they were O.K., sometimes they'd create obstacles that really didn't need to be created.

HKS: You find that in the States.

RJG: You find that in the States. I had relatively little trouble over the years. It was just those last years, when that wave of bad publicity just overwhelmed the project. We could do nothing right. I went to a meeting in Brasília with the Minister of Energy, at the offices of the Ministry of Energy. At that time we were trying to get approval to build the hydroproject. I went prepared, had all our studies, everything we'd done. They couldn't have cared less. I mean, their minds were closed to even listening, you know, to what you had to say at that point. This was in 1980.

HKS: So it officially closed down in '82 or something? Something about that order? Transferred completely to Brazilian control.

RJG: '82. Right.

HKS: And all Brazilian personnel. No Americans left.

RJG: No. Not one left. I think Johan was one of the last ones to leave.

HKS: And he still apparently maintains some kind of contact with them.

RJG: Johan's attitude is kind of different. I'm bitter about the way the Brazilians took it. He wishes that it had continued in Ludwig's hands and we were able to complete the project. But Johan feels that most of the forestry community thought that the project was unviable and would never go, be successful, or even continue to exist. Johan does some consulting for them even yet. As Johan explains, here it is seventeen years after that pulp mill went into operation, and it's still operating. So there must have been something to it. Now, granted, the people that are running it now got the whole thing for nothing. They didn't have the billion dollar investment. But on the other hand, it is still running. You know, he says, we must have done something right forestry-wise. And I think he's got a good point.

HKS: I don't know if you've talked to Clayton about it. He doesn't seem bitter.

RJG: Perhaps for the same reason. But I [emphasis] am, and justifiably so. I admired Mr. Ludwig, and to have it taken from him like that. I mean, how can you do it?

HKS: Clayton certainly revered Ludwig. I mean, it comes out many times.

RJG: Yes.

HKS: There's only one favorable article I've read. It was one of the more recent, in the *Journal of Forestry*. There's some others, but most of them are negative, highly negative. A lot have very personal attacks on Ludwig the man, and they call it jungle madness, and all of this in otherwise respectable magazines.

RJG: You will find the same attitude among Brazilians. The people that were there are for the project, optimistic, like me, including the Brazilians. You find Brazilians that were there, with us at the time--I mean, they're as much for it as we are. It's just that they're a tiny minority, those that really knew what was going on.

HKS: So much of the development in Brazil has a bad press now. All of their road building and all the rest.

RJG: It's just that things have changed over the years. If you look at this project in Brazil, let's say it went to five hundred thousand acres. Well, you wipe out five hundred thousand acres of Amazon rainforest. But in its place you establish another forest, not the same forest, but at least another forest. If this were done over a period of twenty years, in those twenty years, tens of millions of acres of Amazon rainforest have been destroyed by clearing for agriculture. It is a drop in the bucket, that five hundred thousand acres. Why can't the general public see this simple fact? And those acres that are cleared for agriculture, are gone forever. People become so irrational. We're supposed to be, you know, a sophisticated, technologically oriented society.

HKS: It's fashionable to believe the worst about things.