



Frazer at 1985 Keck Telescope groundbreaking

WILLIAM R. FRAZER
(b. 1933)

INTERVIEWED BY
TIMOTHY D. MOY

March 17, 1992

ARCHIVES
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Pasadena, California



Preface to the Keck Series Interviews

The interview of William Frazer (1992) was done as part of a series of 7 oral histories conducted by the Caltech Archives between 1991 and 1992 to document the early history and development of the W. M. Keck Observatory at Mauna Kea, Hawaii. They capture the observations and perspectives of administrators, astronomers, designers, and managers representing both Caltech and the University of California, who would jointly manage the project.

Thanks to the support of Howard B. Keck, in 1985 the W. M. Keck Foundation donated \$70 million for what would become known as Keck I. Construction began in September 1985 to build a telescope equipped with a 10-meter mirror consisting of 36 hexagonal segments that would work together to form one single reflective surface. Using only 9 of the segments, first light occurred in November 1990. By 1991, a further Keck Foundation donation made it possible to begin construction of Keck II—also with a 10-meter segmented mirror—with first light occurring in October 1996.

Subject area

Physics, astronomy, Keck Observatory, Berkeley

Abstract

An interview in March 1992 with Dr. William Frazer, professor of physics at UC Berkeley (emeritus since 1996).

As UC's senior vice president for academic affairs (1983-1991), he oversaw the planning for Keck I, the first of the W. M. Keck 10-meter telescopes on Mauna Kea. He discusses the offer of funding from the Hoffman Foundation and its eventual withdrawal and replacement with Keck Foundation money. He recalls his interactions with UC president David Gardner, Caltech president Marvin L. (Murph) Goldberger, and Caltech provost Rochus E. (Robbie) Vogt, as the UC/Caltech partnership was put together; plans to have a Keck telescope and a Hoffman telescope; the uneasiness of the UC astronomers at the prospect of an equal partnership with Caltech; and the disagreement over the siting of the telescope's headquarters in Hawaii.

Administrative information

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Groundbreaking ceremony at the site of the Keck Telescope on Mauna Kea, Hawaii. Fall 1985

Left to right: Albert Simone, University of Hawaii President; Caltech President Marvin Goldberger; Howard B. Keck, president of the W. M. Keck Foundation; Hawaii's Governor George Ariyoshi; University of California President David Gardner; and William Frazer, Chairman of the California Association for Research in Astronomy (CARA). Fall 1985

CALIFORNIA INSTITUTE OF TECHNOLOGY ARCHIVES

ORAL HISTORY PROJECT

INTERVIEW WITH WILLIAM R. FRAZER

BY TIMOTHY MOY

BERKELEY, CALIFORNIA

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ORAL HISTORY PROJECT

Interview with William R. Frazer
Berkeley, California

by Timothy D. Moy
March 17, 1992

Begin Tape 1, Side 1

MOY: Where were you born and raised?

FRAZER: Indianapolis, Indiana, 1933. Raised in Indiana, went to Carleton College, and then got my MA, UC Berkeley, 1956, and PhD, 1959.

MOY: And that was in physics, right?

FRAZER: Yes. Then one year at the Institute for Advanced Study in Princeton. Actually, I worked at the Rad Lab [Radiation Laboratory, MIT] in the summer but then a year at the Institute for Advanced Study, and then I became a faculty member at University of California, San Diego.

MOY: And you became vice president [of UC] in '81, and you're retiring at the end of—?

FRAZER: Well, I'm leaving the vice presidency this fall and I'll go back to teaching and research [at Berkeley].

MOY: On to the origins of the Keck Telescope. When and how did the University of California first become interested in a 10-meter telescope—essentially, a telescope larger than Palomar?

FRAZER: It goes way back. It was in the seventies—I'd say roughly 1970. David Saxon [UC president 1975-1983] really got into high gear, working closely with the astronomers.

MOY: Would you say this was something you inherited when you became vice president [1981]?

FRAZER: Oh, definitely. It was well along. In fact, we had a pretty organized effort in the University of California. We had a committee that was supervising this. In fact, Jerry [Gerald M.] Smith was hired to be the project manager [1983] before Caltech ever came into it.

MOY: So [UC] had been part of this even well before the—

FRAZER: —before the Keck gift.

MOY: When you became vice president, was the [Jerry] Nelson design pretty much already the one that was favored?

FRAZER: Yes.

MOY: There were no other plans in the running at that point?

FRAZER: No. What had happened was that David Saxon had put in quite a bit of university money to plan and design the telescope. But the university was searching for a major donor to make it possible. And that was the state of affairs until the first suggestion that we might have a major donor in this Mrs. [Marion O.] Hoffman. I believe that occurred around 1983.

MOY: So you were vice president at that point?

FRAZER: Actually, there's two stages. I came in '81—I was called the academic vice president. But I didn't have a lot to do with the telescope until, in '83, David Gardner became president and I moved up a notch—to so-called senior vice president—and I became the university's principal administrator on the telescope project.

MOY: Prior to that time—1983—who were the primary University of California people, both in administration and on the academic side of things?

FRAZER: The primary person in the administration, aside from David Saxon, was Vice President William B. Fretter. Then there was a 10-meter telescope Executive Management Committee, chaired by Harold Ticho, who was then vice chancellor at San Diego. He's still there. He's retired, I believe. There were a lot of other people on that committee—Rod [Roderic] Park, vice chancellor at Berkeley, [Berkeley astronomer] Len [Leonard] Kuhi, Chancellor [Robert] Sinsheimer from Santa Cruz—a committee of, I don't know, eight people, maybe. And as I say, they hired Jerry Smith to be the project manager.

MOY: And from where did they hire him? Where had he been?

FRAZER: The Jet Propulsion Laboratory.

MOY: Prior to 1983 then, Saxon *et al.* had been actively searching for donors?

FRAZER: Yes.

MOY: And do you recall what the situation was?

FRAZER: There wasn't any luck. They had gotten the services of a prominent philanthropist, Eugene Trefethen. He was president of Kaiser Industries, and he was leading the search for a major donor. But nothing happened. [Laughter] Until the actual Hoffman gift.

MOY: Was the University of California, at that time, looking for other academic partners?

FRAZER: No. Because we were hoping for one gift large enough that we would do this all by ourselves.

MOY: And at that time do you recall roughly what the expected cost of the construction of the telescope would be?

FRAZER: Oh, it kept going up and up and up. I recall a number on the order of \$50 million. Because I do remember when we got around to asking for the money from the Keck Foundation, we based the cost of the telescope on a faulty analysis, which really was too low. I think we were estimating something on the order of \$50 million—it had probably gone up to \$70 million by the time 1983 rolled around—somewhere in that range.

MOY: When and how did Caltech become involved in the project?

FRAZER: There were a couple of stages. Let me give it in what I think is right, but I'm not sure chronologically which is exactly right. We got the Hoffman gift and it was only \$36 million, and \$36 million was not enough. We thought we needed at least another \$25 million to make this go. Even that wasn't the full cost, but we could have come up with a bit more. So we needed another \$25 million. And I asked David Gardner—and talked to the chancellors—for permission to approach Caltech. Why Caltech? Everybody knew of Caltech's eminence in astronomy, and also knew that they were looking for something, because Palomar wasn't going to be the big deal forever. Secondly, I knew the president of Caltech, Murph [Marvin L.] Goldberger. I'd known him from my graduate student days.

MOY: Were you grad students together?

FRAZER: No, he's considerably older than I am. I knew him from my Princeton days. He was a professor at Princeton, and I was a postdoc at the Institute for Advanced Study. And we actually collaborated together. We never published anything, but we worked together, so I knew him well and liked him. And I just called him up. And I said, "I'd like to come and see you, Murph—see if you'd like to join us as a partner on the telescope." I said that we needed \$25 million to make it go. Then the next step, I believe, was that Murph sent a Caltech team to work with us for a period of a couple

months to see if they thought it was a competent project. And they also checked out [the University of] Arizona as another possible partner, and they came to the conclusion they liked ours better.

MOY: So the Hoffman money was already definitely on the table—practically in the bag at that point?

FRAZER: Yes. That, of course, is a complicated story, too. Because Mrs. Hoffman died, and then there was a trust that was set up, which never could agree.

MOY: I do want to talk about that in more detail.

FRAZER: OK. But at any rate, the Hoffman gift had been made. We perhaps even had the money in the bank.

MOY: And Caltech was really the only other partner that the University of California considered? And that was mostly from your initiative, personally?

FRAZER: I'd say yes.

MOY: My impression is that there had already been a fair amount of back-and-forth between the UC and Caltech astronomy communities on technical advice.

FRAZER: There probably had been. That's why I was hesitating as to whether the Caltech interaction with our astronomers on the telescope preceded or followed my visit to Goldberger. Caltech may have already been looking around to see whether they wanted to perhaps join us. But other than that, I don't know if there was interaction between the astronomers. The interaction, of course, became intense after we proposed that Caltech might be interested in coming in as a partner.

MOY: Let me just make sure that I have this correct. It would have been for \$25 million, for one quarter of the observing time. Is that right?

FRAZER: Well, it probably would have come out to be more [time] than that. Because \$25 million—and suppose they put in \$25 million we put in \$36 million plus—it might have been as much as forty percent, I would say. It would have been worked out so they would be a junior partner, but maybe a forty-percentage partner or some such. We hadn't done the numbers. But I said, "You've got to come up with \$25 million to buy in, because we need that much to make the project go."

MOY: What is your recollection of how that played down in Pasadena?

FRAZER: Well, I didn't see a lot of the people after my original meeting. My original meeting, when I went down there, was with Murph, the provost Robbie [Rochus E.] Vogt, and Ed [Edward C.] Stone [chairman of the Division of Physics, Mathematics, and Astronomy]. We talked it over and then I didn't hear anything. I don't know what month that was. I didn't hear anything until August.

MOY: This is in 1984?

FRAZER: Probably. I didn't hear anything until August—and that was pretty dramatic. I like to tell that story. I was at the Aspen Center for Physics, where I go every August, and Murph was at the Aspen Institute for Humanistic Studies. And he came over to see me. We took a hike together, a long hike up to something called Buckskin Pass, where we liked to hike. And partway up he dropped his bombshell. "Bill, I have either a real problem or a great opportunity for the University of California." [Laughter] Those were his exact words. And he told the story that you've undoubtedly heard, that he had \$20 million of the \$25 million, that he went to his ace-in-the-hole, Howard Keck, told him about the project, and Howard said, yes, he was interested. But it was all or nothing. [Laughter]

MOY: \$70 million.

FRAZER: Or nothing. I either pay for the whole thing or nothing.

MOY: So that was the first you heard that he had [approached Howard Keck].

FRAZER: It was in Aspen, in person.

MOY: What was your reaction?

FRAZER: My reaction? [Laughter] “My God,” I said, “I’ve got to think about this, Murph. I’ve got to call David Gardner.” And I said, “Look, David made a promise to a dying woman, and we have a commitment. We can’t just go to the Hoffman heirs and say, ‘Well it’s been nice knowing you, but we’re not going to do this. Here’s your money back. We’re going with Caltech.’” It was complicated by the fact that I couldn’t get in touch with David Gardner, because he took his vacations on an island in a lake in Idaho called, I think, Wild Horse Island. At any rate, he’s out there with no telephone and no nothing, and the only way he can get in touch with civilization is by rowing in. [Laughter] Eventually I got in touch with him, and he said, “Well, we can’t go back on our promise to Mrs. Hoffman.” So my initial reaction was, “What in the hell are we going to do?”

MOY: I’d like to dwell on this just a little bit. When you heard the words, did the blood run cold, and your heart begin—or was there this mixture of feelings?

FRAZER: Oh, no, no, no. All kinds of questions went through my mind: This is a great opportunity, but how the hell are we going to do right by the Hoffman gift? And then secondly, Well, is there any way we can keep them both? And then thinking, too, How are the Caltech people going to be to work with? Are they going to suddenly want to try to take this thing over? We did, I guess shortly after this, have a meeting in the Denver airport, where I and a couple of my colleagues, including our general counsel Don [Donald L.] Reidhaar, met with Robbie Vogt and Kali—Julian von Kalinowski, from the Keck Foundation—and a few others from Caltech. And we started discussing how we might do this—highly exploratory still. And there were no good ideas. I think Bob [Robert P.] Kraft, the director of Lick Observatory, was there too, and probably Gerry Neugebauer [director of Palomar, 1980-84].

MOY: Who was your general counsel?

FRAZER: Reidhaar. He died; he committed suicide, actually, a year or so later [December 1985—ed.]. He was instrumental in setting all this up. He was very, very, very helpful, a really good guy.

Then they came back home [from Denver]; actually, I was still in Aspen. And I began getting long memos from Bob Kraft, who was analyzing the possibilities for me.

MOY: How long were you in Aspen?

FRAZER: A month.

MOY: Again, after Murph told you this, did you just say, “I have to make a phone call,” and then immediately try to get in touch with President Gardner?

FRAZER: There were days, many days, of intense activity. I had a very good person here on my staff that I immediately asked to get on this—Jim Albertson. He became very prominent in all of this, too. And, of course the big breakthrough for us was to come up with the idea of building two telescopes, and that was Bob Kraft’s idea. Now maybe others had the idea simultaneously, but it was Kraft who wrote me the long letter saying this is an idea to take really seriously, and he talked about the interferometry and all of that. Then I set up a small group, chaired by Charlie [Charles H.] Townes, to advise me: “Does this make sense?” And of course, as it came out, it did. Then, to make a long story short, of course, the Caltech folks we were working with also thought this was a great idea and went to try to sell it to Howard Keck, with success. And I went to try to sell it to the Hoffman heirs with no success. [Laughter]

MOY: Let’s talk a bit about the Hoffman gift. First of all, how did that offer originate?

FRAZER: Totally remarkably. It was totally unsolicited. Mrs. Hoffman had a brother who lived in San Jose. He read an article in the *San Jose Mercury News* about UC’s efforts to build a 10-meter telescope, in which they also said they were looking for a

donor but hadn't found one yet. And he knew that his sister was looking for a way to memorialize her husband, who had died recently. And he called up somebody in the University and said, "You know, I think my sister might be interested in this." Then some contact was instituted.

MOY: And who was doing that from the UC side?

FRAZER: It happened mainly at Santa Cruz. And a number of people were involved there. Joe [Joseph T.] Calmes. Also at that time the director of development was involved. But eventually they made the contact with Mrs. Hoffman, and David Gardner went to talk to her personally.

MOY: At Santa Cruz, that was Calmes?

FRAZER: Yes. Joe Calmes. He's still their associate director at Lick. He would know a lot about these details.

MOY: And then President Gardner got in touch and eventually—

FRAZER: —and eventually went to Los Angeles to see Mrs. Hoffman.

MOY: They're in Los Angeles?

FRAZER: Yes.

MOY: I didn't realize that. And most of this money had come from BMW importing. Is that correct?

FRAZER: Yes. It's Porsche.

MOY: How did that play out? At some point in late '83 or early '84 there was this understanding about a gift of \$36 million.

FRAZER: Well, it was a promise from Mrs. Hoffman. And she and David Gardner shook hands on this and he left. She went off to the hospital and died [December 1983].

MOY: Very quickly.

FRAZER: Yes, it was. She was ill, but she wasn't about to die that day.

MOY: It was throat cancer or something?

FRAZER: Yes, I think so. And she left a very poorly drawn will, which had put the money in a trust in which she was one of the trustees. Her trusted secretary—long-term secretary and assistant whose name I've now forgotten [Ursula C. Niarakis—ed.]—was another one. And a third, though, was her sister. And then she left her sister very little in the will. [Laughter] And so her sister and this secretary never could agree. And it said the third trustee, in the event of Mrs. Hoffman's death, was to be named by agreement between the other two. They never agreed. In the meantime, the secretary had found a way to actually give us the money. We had the money. But we had a zillion lawsuits. We had a legal mess in the New York probate court, the so-called surrogate court. And so we faced considerable delays before we would have been able to use that money, actually.

MOY: So the secretary was still intent on making the gift.

FRAZER: Because of some complex thing, the money first went to her in another intermediary trust when she was to give it to this other trust. But while she still had it, she transferred it to us. And so we actually had it. We actually had the money.

MOY: Eventually the trust split, is that right?

FRAZER: Eventually the two of them couldn't agree. Afterwards, I made the presentation about the two telescopes [one named for Hoffman and one named for Keck], and they couldn't agree on that. Basically, in my analysis, the sister felt that she had been left out

in the will, and she would have at least liked to have had some fun in playing with this trust money. Even though she'd have had to give it away.

MOY: And did you have any sense of whether she was also sympathetic with going through with the telescope?

FRAZER: No. No sign of that.

MOY: And so most of the legal difficulties really came from her side, the sister's side of the trust. There's some confusion in my mind about exactly what finally happened with the Hoffman money. I know that it didn't come through, but when and how and who decided that this was just not going to work?

FRAZER: The legal action went on, and went on, and went on, and at some point we just gave the money back. I believe it was our general counsel who decided that nothing was coming of this and decided to give the money back. I'm sorry, there's more to it than that: When the Hoffman heirs—all this vast body of people—decided that they did not want to go with the two telescopes, we amicably agreed to give the money back.

MOY: At that point, the idea was that there would be a Keck telescope and a Hoffman telescope, right?

FRAZER: Yes, that was the proposal, and the Hoffmans said no, and so then we amicably gave the money back. It would have been nice to keep all the money, but what we had done was to find an honorable way to accept the Keck gift. [Laughter] At the time, I thought, "God, [snapping fingers] we found a clever way to do this." I faxed all of this off to David Gardner on his island, and we decided to go ahead with this.

MOY: So all this happened within a relatively short amount of time.

FRAZER: The decision to go with the two-telescope proposal probably happened in about a month from the time Murph talked to me.

MOY: And President Gardner was still in Idaho.

FRAZER: Yes. And then we made our various attempts. I think it was early fall by the time I went to New York with Charlie Townes and Harold Ticho to try to talk the Hoffman interests into this wonderful project. But that failed.

MOY: So there's a Hoffman office in Los Angeles and New York.

FRAZER: Well, I don't know why it was New York.

MOY: When you say the Hoffman heirs were not interested in going in on the second telescope, is there any distinction between the sister's faction [and the others]?

FRAZER: No, it definitely was the sister's faction that wasn't interested. The secretary really wanted to carry out Mrs. Hoffman's wishes.

MOY: Even as a second telescope.

FRAZER: Yes. I believe so. But since they could never get together, it was moot.

MOY: There was an article in the *Los Angeles Times* Sunday magazine, in 1987, in which Howard Keck essentially says that sometime in the second half of 1984, while the Hoffman money was still in this entanglement, Murph Goldberger flew up here and delivered some kind of ultimatum to David Gardner. Essentially either "Work it out, go with us," or Caltech would go it alone, would actually build the telescope by itself.¹ Is there anything in your recollection of this?

FRAZER: No, there's nothing of that. Because for one thing, Murph was talking to me in Aspen and his contact with David Gardner was really quite limited. No, there's nothing to that. I mean Murph delivered to me a challenge, not an ultimatum. [Laughter] And obviously behind it all there was a dilemma for us. If we had said, "Go away and take

¹ Paul Ciotti, "Mr. Keck's Bequest: Caltech Vs. UC Berkeley in a Story of Academic Intrigue, Technological Breakthroughs and Astronomical Ambition," *Los Angeles Times*, May 24, 1987.

your money,” what would Caltech have done? Because we had a lot of advanced work, and we had the expertise, and we had Jerry Nelson. Obviously we were a much better team together than separately, and all of my interactions with the Caltech folks—and this was primarily Murph and Robbie Vogt, Ed Stone, and Don Fowler, the general counsel—were extremely gentlemanly. There were no threats. And we were intent upon working it out. And we did. Obviously people say, “what if,” but we did work it out.

MOY: Everybody I’ve talked to has commented on how very amicable everything was. Did you feel at that time that there could have been some sense of academic integrity, too? Again, it was essentially a UC idea.

FRAZER: Yes. I think the Caltech people behaved with great integrity. Of course, you’ll be getting into this—the next phase was getting together. Once we had come this far, then the big problem was, “How do we get organized to do something together?” And that was a major challenge.

MOY: Actually that was the next thing I wanted to talk about. But I just want to back up for a second and talk about the astronomers. Who and how did that person break the news to them?

FRAZER: That was not the best part of the interaction. Preceding informing of the astronomers, there were some discussions with Caltech folks, principally Robbie Vogt and me, on how we would organize this project. Once we saw that things were coming along, maybe there was an announcement made to the press or something—I really don’t know how it was done. But I did not take any special care to break this to the UC astronomers. They essentially read about it in the newspaper. And they were not uniformly overjoyed, let’s put it that way. [Laughter] I had not understood the strength of the sensitivity. They had thought, “Here’s our opportunity to be unparalleled number one in the world all by ourselves, and now you’re letting in, as fifty-fifty partners, our archrivals, Caltech!?” And so my reaction was, “What do you want—half of a real telescope or all of a virtual telescope?” [Laughter] But at any rate, I had totally underestimated that, and I got some angry nocturnal phone calls from Margaret Burbidge

and others. Some of the things she said don't deserve to be printed. [Laughter] Fortunately Sandy [Sandra] Faber, who gave me one long evening phone call, explained to me why the UC astronomers were so upset and so forth and so on, but she was very rational about it. She agreed. She was one of the ones that obviously would rather have half of a real telescope, settle down to work in earnest.

MOY: Sandy Faber and Margaret Burbidge are both UC astronomers?

FRAZER: Margaret Burbidge at San Diego is a very distinguished astronomer of the older generation; she's retired. And at Santa Cruz, Sandra Faber is one of the brightest and best young astronomers in the world.

MOY: And had worked with Gerry Neugebauer [at Caltech]. Is that right?

FRAZER: Well, that could be. She's worked with a lot of people. Pick up an average issue of *Science* magazine and see what great discoveries have been made on the Hubble Space Telescope, and there will be a couple, and she's made both of them.

MOY: Who were the people who did work out the details of the arrangements: the formation of CARA [California Association for Research in Astronomy], essentially?

FRAZER: There were two meetings. There was one wonderful meeting I will never forget, where I went down and spent an evening and then all day—Robbie Vogt and I in his office spent an intense day—morning 'til night. I came in, and he'd written on the blackboard a set of eighteen points we had to work out. And by the time the day was over, we had worked them out. We had a second meeting—and I don't know which was first—that had Robbie and me, and Ron [Ronald W.] Brady, my financial counterpart across the hall, and their financial vice president. I forget his name.

MOY: [David] Morrisroe?

FRAZER: Yes. And the two general counsels. And we didn't talk as long, but we worked

out such things as, “Well, what would an equal partnership constitute?” And it was Brady who figured out that the amount we would put in in operating costs over twenty-five years was about equal in present value to what Caltech would be putting in. And so a fifty-fifty split on this was perfectly appropriate. And then I think my meeting with Robbie was second, and we worked out the details, such things as [that] a board of directors had to have equal representation of the two institutions.

There was one bit of sensitivity that came up. We worked together and we worked out all of these details. Then we set up a committee called the—I forget—ICC—some interim coordinating committee that was chaired by Jim Albertson and Ed Stone. And they went ahead and worked out a lot more of the details. And so eventually an MOU came up and all that, and there was only one stressful point.

MOY: I’m sorry—what’s an MOU?

FRAZER: Memorandum of Understanding between the two institutions. And that was duly signed by both; the regents got in on the act and all that. There was only one stressful point, and it was different from what Howard Keck says. Howard did not like the idea of a board of directors with three representatives from each institution. You know, Howard was giving his money to Caltech. At that time, he had a little bit of distrust of public universities—arm of the welfare state or some such thing. Actually, the Keck Foundation now gives a lot to the University of California. And this relationship of respect has really grown out from this, from CARA. But at any rate, Howard didn’t like the idea of this three and three. So how would we settle differences? Well, as Robbie and I said, if we have a fundamental difference, we’re in a lot of trouble anyway. So we would just have to solve it. And we have. Now, his [Howard Keck’s] idea was that there would be a representative of the Keck Foundation on the board who voted. David Gardner and I saw that as Caltech having four votes and UC having three. And David did get a call from Murph that said, in effect, “David, I talked to Howard; he absolutely insists on this.” And David said, “I cannot and will not take that to the regents. You’re going to have to educate Howard.”

MOY: Which he did.

FRAZER: Which he did. He and Robbie went and they did it. [Laughter]

MOY: That's very interesting. That's not one of the things that I had heard about.

FRAZER: Yes. That would be a little sensitive still. [Laughter]

MOY: One other element of debate that I've heard about in talking to astronomers, mostly, was that there was some discussion over the location of the telescope's headquarters. Isn't that right?

FRAZER: Oh, yes. Yes. That was the one case where the board took several meetings to decide, and we were split by institution. For no good reason. It just worked out that way. There was no institutional interest in either of these. Except for the fact that the Caltech submillimeter facility had its headquarters in Hilo, but I hadn't thought that was a very big deal. So, yes, whether to put it in Waimea or Hilo. And Jerry Smith, the project manager, had concluded it ought to be in Hilo, because there were more people there and more supplies and such. Waimea—there's really nothing there. From my viewpoint, there's nothing in Hilo, either. And so we did a lot of analyses and went round and round and eventually that one got settled, through the intervention of Howard Keck. Finally, Caltech changed their mind.

MOY: And agreed to go to Waimea?

FRAZER: Yes. And I think it was Kali [Julian von Kalinowski] who got Howard in on the act and put the pressure on. But I don't know the details of that.

MOY: Did the fact that the Smart Trust in Hawaii had the land for Waimea play a role?

FRAZER: Yes. They gave us the land.

MOY: Was that part of the complication at all?

FRAZER: No, that was an inducement to go to Waimea. But in Hilo we were going to get land, I think, from the community college district, or something; so I think in either place we wouldn't have had to pay for the land.

MOY: So it was pretty much just arbitrary. It just broke down that Caltech generally wanted Hilo and [UC wanted Waimea].

FRAZER: Well, there were a lot of arguments, lots and lots of arguments. Waimea and the Kona coast are booming. Hilo is a dying sugar-plantation town. And the economic activity is on the dry side now, not the wet side. So from Ron Brady's point of view—he had gone and looked it all over and talked to all the bankers and all that—it was obvious to him that Waimea [should be] the site. And you know, Ron had no special interests. So he did this analysis and it seemed right to me, and I supported that.

MOY: And who is Ron Brady?

FRAZER: He's the senior vice president for administration. He's also a member of the CARA board from the beginning.

MOY: Are you familiar with how the site on Mauna Kea was selected?

FRAZER: The exact site, or that Mauna Kea was selected?

MOY: Mauna Kea itself.

FRAZER: That was done by the UC folks long ago, and a lot of effort went into that. First of all, UC wanted to put it in California, and there was a site discussed. But it eventually turned out to be sacred Indian this, that, and the other thing. And so they started looking all over the world. And Mauna Kea and the Canary Islands came up. I don't know what considerations went into it, but the site had been selected before I came onboard. And a lot of work had been done on the quality of the seeing and all that sort of thing.

Begin Tape 1, Side 2

MOY: Was there some discussion, when there was this prospect of having two telescopes, of having a Northern Hemisphere telescope and a Southern Hemisphere telescope?

FRAZER: That was one of the options presented to me. Bob Kraft wrote me this long paper; that would probably be the preferred one. I said, "No way. This is the University of California. It's a public institution, and to try to sell to the regents and the people of the State the idea of putting a telescope in a country run by some little dictator in South America is not what I want to be in on." [Laughter]

MOY: What about having Keck's telescope in Las Campanas?

FRAZER: The Caltech folks didn't want to ask him that one. Because they thought he'd prefer to have his telescope on Hawaii. I would, if I were he. It was not a solution.

MOY: All this was working out, again, with the slight resentment on the part of UC astronomers?

FRAZER: It vanished quickly.

MOY: And where was that resentment channeled, mostly?

FRAZER: [Points to self]

MOY: At you?

FRAZER: Yup, me. "Bill, how could you have done this to us?" [Laughter]

MOY: So it wasn't really at Howard Keck or at Caltech?

FRAZER: One comment that a UC astronomer made to me, which is probably humorous enough to go in here, but still sensitive, was, "Bill, you are going to be entering into an

equal partnership with Caltech. I have every confidence that you are the intellectual equal of the people you will be working with at Caltech. But I have no confidence that you will be equal to them in cunning and guile.” [Laughter]

MOY: Well, given that sentiment—and I don’t know how widespread it was, but, as you say, it dissipated—was there concern here, from you or from others on the UC side of things, that all of this might in some serious way sour the prospects of a cooperative venture?

FRAZER: No, after I had talked to Sandra Faber I was confident that people just needed time to settle down. They could take out their wrath on me—what the hell! Also, Jerry Nelson was constructive from day one. He was in on the discussion from the beginning. He also told the astronomers the same thing: “You want half a real telescope or all of a virtual telescope? Come on.” And so everybody settled down to work.

MOY: And my last question is, when and how did you first hear about the Keck donation for the second telescope [Keck II], and did that surprise you?

FRAZER: I heard about it officially the same time everybody else did. But it had been apparent to us for a long time that—and von Kalinowski said as much and so did a lot of other people—that Howard really wanted to fund the second telescope. And that all he was doing was waiting until we really demonstrated that we could build a telescope. So at the time of first light, it came through. By that time, we had expected it.

MOY: So [from] the way you just phrased it—that he would fund *the* second telescope—there had always been a presumption that there would be a second telescope?

FRAZER: Well, we situated the telescope on the plot of ground with the second one in mind. And from day one, there were artists’ conceptions showing two telescopes and all that. Yes, we were committed by then to trying to find the money for a second telescope once we got the first one. We had thought, but we didn’t know for sure at that time, that Howard would be interested. Maybe the Japanese would be interested. Somebody

would.

MOY: So it wasn't a surprise that somebody did it.

FRAZER: It soon became clear that Howard wanted to do it.

MOY: Well, that's pretty much it for my questions. Is there anything else that comes to mind that you feel would be relevant?

FRAZER: Oh, not offhand. There are an awful lot of people that have been involved in the course of this. And as for a chronology of the efforts on UC's side preceding the Hoffman gift—you've got only a very sketchy account of it. I've given several reports to the regents that summarize this.