National Park Service (NPS) History Collection

NPS Paleontology Program Records (HFCA 2465)
Vincent Santucci's NPS Oral History Project, 2016-2024

Vance Haynes
May 10, 2016

Interview conducted by Vincent Santucci et al.
Transcribed by Unknown
Edited by Molly Williams

This digital transcript contains updated pagination, formatting, and editing for accessibility and compliance with Section 508 of the Rehabilitation Act. Interview content has not been altered with the exception of omitted PII.

The release form for this interview is on file at the NPS History Collection.

NPS History Collection
Harpers Ferry Center
P.O. Box 50
Harpers Ferry, WV 25425
HFC_Archivist@nps.gov

Narrator: Dr. Vance Haynes
Interviewers: Vincent Santucci, Kathleen Springer, Jeff Pigati, and Henry Brean.
Date: Tuesday, May 10, 2016
Location: University of Arizona
Signed release form: Yes
Transcribed by: Unknown

Transcript

[START OF INTERVIEW]

[START OF TAPE 1]

VS: I think you know these folks, but just for everybody.

KS: I'm Kathleen Springer, I'm a geologist with the USGS.

JP: Jeff Pigati also a geologist with the USGS.

HB: Henry Brean with the Review Journal, we met downstairs.

VH: Nice to see you. (laughter)

VS: Vince Santucci with National Park Service.

VH: Do you go by Vince or do you prefer Vincent?

VS: Either is fine, so we want this to be informal relaxed, just a couple of thoughts to share.

VH: Although some of the questions we have might have obvious answers that we all know, we want to hear in your words your views on it. So feel free to elaborate, and to share as much information, as you feel relates to whatever the question is. Don't assume that we all already know it. We'll be able to use this in a lot of different ways for public education and for future researchers so feel free to elaborate as much as you feel comfortable.

VS: So, just to begin with, today is Tuesday, May 10th, 2016. We are gathered here on the campus of the University of Arizona to interview Dr. Vance Haynes. This oral history interview is being conducted by the National Park Service and is intended as an archival resource to support future research and interpretation at the Tule Springs National Fossil Beds Monument in Nevada. I am Vince Santucci the senior Paleontologist for the national park service geologic resource division. I'm joined by Jonathon Burpee, Superintendent at Tule Springs Fossil Beds National Monument and Erin Eichenberg, Museum Curator for Lake Mead National Recreation Area. Tule Springs Fossil Beds and several other park service units. We are also joined by Dr. Jeff Pigati and Kathleen Springer, geologists with the US Geologic Survey. Additionally, we are joined by journalist Henry Brean from the Las Vegas Journal Review.

VS: So, are you ready Dr. Haynes?

VH: Sure.

VS: Just want to start off chronologically; I think it would be helpful to know a little about your past. So, when and where were you born?

VH: I am from a military family. My father was in the old Air Corp/Air Force in WW1 on up through the Korean War. So, I lived all over the place. But, I was born in Washington and left there when I was two. I don't remember any of that (laughing)

VS: Are you willing to share your date of birth?

VH: Leap year - I can drink legally now.

(laughter by all)

VS: Do you recall from your childhood any experiences or factors which may have contributed to your interest in history and science and higher education?

VH: Well, of course as a kid you know hunting for arrowheads and stuff was the beginning. And living on old Air Corp Bases as a kid, there were certain trash cans that you would always go to. You'd go to the parachute shop, see if you could find a pilot's shoe. [Langley Field, Hampton] Virginia back in those days was the headquarters of the NACA which later became NASA. So they had these huge wind tunnels and they would make these balsa wood models to put in the wind tunnel. So we were always getting balsa wood out of the trash cans. Talking to the guys to see if we could have one of the models that they got through with. So, I interested in this stuff.

VS: Excellent. Can you briefly explain your educational background, in archaeology, geology, and other disciplines?

VH: I started out, I went to prep school when my mother worked at Sperry Gyroscope during the war. She got me into the school that a Colonel couldn't afford in those days. She convinced them that his father's overseas fighting the war and she's working in a war plant [unclear]. Once I got into the [unclear] school (coughing in background) in Pottstown, Pennsylvania and particularly liquid fuel rockets.

And so when I graduated I went to Johns Hopkins. Dr. Van Allen was there, with the idea that I wanted to study rock propulsion. But they didn't have a propulsion option in those days. What you had to do was go through mechanical engineering and so I did that. I started taking geology courses as optional courses and found it absolutely fascinating. I wanted to talk to Dr. Van Allen and his secretary told me, "Well you know he is out at the lab in Silver Springs most of the week. But he comes to the campus on Wednesday and he eats at the cafeteria." So, I ambushed him at the cafeteria and first thing he asked me, very nice he had me sit down and then he was in a booth. He said, "How are you doing in math, physics or chemistry?" I said, "Well, I'm getting by". He said, "What do you mean by getting by?" I said, "Well, you know I'm passing (chuckling) and he says, "Well, you know unless you want to eat, breath, and sleep higher mathematics and celestial mechanics, you just want to push a bottom and watch a rocket go off". I said, "Yes sir, I want to do that too" (laughing). "But I'm really interested. Anyhow, it scared me enough because I was having trouble. I was getting by, but I was having trouble.

But I was having a great time in geology with some great professors. One of 'em was Dennis Close, a world famous structural geologist. So, with that, there was also an economic geologist, Dr. Singwall and he told me what I wanted to do with geology, and I said, "Well explore for mineral deposits," So he said, "Well you know the best, he said John Hopkins if you graduate here in geology you are going to have to work for state or government surveyor. But if you are interested in exploration, he said, "Ronald School of Mines, Colorado School of Mines, or Mackey School of Mines is where you got to go". I said, "Which is the best of those?" He said, "Oh, probably the Colorado School of Mines".

So anyhow, I talked this over with my folks and went to Colorado School of Mines and there I got interested in rare earths, (laughs) uranium minerals and rare earths. And the war came along and I was on a project. It was a very classified, let's call it an aviation squadron, special weapons. I was on a project over the winter of '53, 1953-54, in Alaska, so I had already been looking some colleagues of mine, some of my old OCS friends. I was stationed in Albuquerque at the Sandia Base, and they got me to hunting arrowheads, even though I wanted to go and look for uranium. So, when I got to Alaska, I had read Reed Warrington's stuff on early man in North America, and knew some of the names in Alaska. So I got to know Floyd [Pawa?] and David Hopkins, people like that. And uh, went out to the muck deposits. These Pleistocene deposits that are filled with extinct fauna, you know and supposedly some artifacts had come out of these. So I got more and more interested in geological aspects of archaeology. And after the war, when I got back to the school of mines I was spending all of my weekends out with archaeologists helping them date their sites.

Carbon-14 was just come on the scene then, so it was a big deal. And so, I got involved in that and one thing just led to another. It was one of the Harvard geologists, Kirk Bryant, one of his students, John Miller that urged me to go on into Pleistocene geology. So, he and Luna Leopold, the USGS, Luna put me on what they called WAE back in those days, which you could work and not be a member of the survey. You could work, doing, they'd help you. They'd pay you but they would also help with expenses and doing research. So that is when I did Sandia Cave, which was a big thing back in those days. So, Miller wanted me to come to Harvard for my PhD and Marie Warrington's former professor Joe Brue, who was head of the department at Harvard, they were urging me to come to Harvard. So, I talked this over with my family and we really wanted to do that.

When John Miller—he contracted bubonic plague he was working with Luna in the Santa Cristo's outside of Santa Fe New Mexico—and he got bubonic plague and he had been doing a research project in the upper Pecos. He had cut his hand on a barbed wire fence so they had thought it was blood poisoning. So when he got back to Cambridge he got very ill, and when Luna heard about it he called immediately and said, "Check him for bubonic plague". See every year there are a couple cases of bubonic plague in Northern New Mexico and sometimes there is – anyhow, they checked him and he had it, but it was too late. By the time they hit him with penicillin it just didn't work. So, then I was in a quandary what to do and of course, Luna, [in] those days he headed up the hydrology business of the US Geologic Survey. So, he says "Well just go to Johns Hopkins and study under [unclear] or go to Arizona study under John Hershberger", and I thought, Oh hydrologist, you know. But when he mentioned Arizona I thought that's a no brainer because Mohowery was here. One of my, turns out one of my favorite professors, John Lance is a paleontologist and Paul Martin was running this. He was working

on fossil pollen, [turning?] laboratory [unclear] and I had been going to regional meetings from the, from the, USG, I mean Geological Survey meetings. These guys were putting on these road shows every year of what pollen was doing with stratigraphy and Carbon 14 dating. And of course Paul Damon was here running a carbon lab, so that was a no-brainer. I finally got in here just so happened that, that fall the Geological Society of America meetings were in Denver and I was in Golden, Colorado. And so, I met Harshberger, and John Lance. They encouraged me to apply. That is how I got into Pleistocene geology.

VS: Excellent. You may have answered this already, but who were your mentors? And who were your academic advisers?

VH: Well John Lance was on my committee, one of the most remarkable people I have ever known. A wonderful guy, he did the paleontology on sites [Navajo Clovis Sites]. And a man named Terrance Smiley, he headed up the Geology laboratories in those days and (coughing), the carbon lab, and Paul Martins all came under the geo-chronology laboratory. It eventually had a world-wide reputation back in the sense, paternery studies, and interdisciplinary studies. And (coughing) when I came here from Colorado, I wanted to get into real carbon dating and so John Lance introduced me to Paul Damon and he immediately asked me (laughing) “How are you doing in geo-physics and chemistry?” I said, “Well I'm getting by.”

(Group laughter)

VH: And I said “No”, cause I was really enjoying chemistry, it was the math that I was struggling with. I think I have a touch of dyslexia (laughing). I'm one of these people when I do a problem I am never sure of my answer, so I'll do it a second time and if I get the same answer a second time, ok. If I don't then I do it a third time, on a timed quiz that is a disaster (laughing). You're down the tubes if you have to do that on every question. So anyhow, Paul said don't worry about it, it will all come back to you. I want you to take my isotope geology and my nuclear geology, so I said, "OK” (laughing) and the first day of class, he walks in and puts a big integral sign on the board and I though "Oh no", (laughing). But then he derives this equation and for the rest of the course he never had us derive. I thought we were going to have to derive equations. And for me, I can do it, but it is a struggle (laughing). We never had to derive. He took great pride in deriving the equations. We just had to use them. So that was great, and I eventually wound up working in a carbon lab, but running a carbon lab.

When Austin Long got the job at the Smithsonian that left no-one. See now, Paul Damon he oversaw, he was a wonderful physicist, chemist, he oversaw the radio-carbon lab, the uranium lab dating, led uranium, argon, helium in this geo-chronology laboratory. So, when Austin was hired at Smithsonian, Paul Damon asked me if I would want to be his Assistant Director of the Land Trust. I said "Sure", you know. And that was good because I was going to use the stuff from Sandia Cave in my dissertation. That summer there was (laughing) with me running the lab and there was, I was going to be running my own samples and I thought "This is great". You know if I foul up, it is going to be my own samples I mess up, not anybody else’s. So that worked out beautifully and so you know that is what got me into Carbon-14 dating.

So, the way that Tule Springs dating came along is that summer of '62, Fred Wendorf, famous archaeologist in New Mexico hired me to work on their paleoecology project of the High

Plains. And, so I joined Jim Hester who unfortunately just died in January. Jim and I spent the early part of that summer, looking at all of these, not only Paleo Indian sites, but also these beds in West Texas and Eastern New Mexico, in particularly the Clovis site of Backwater pond. And that was run by a gravel operator, a commercial operation and he did a stay in a, he had an airstream trailer that he wasn't using. But it was filled with moths and windblown sand, so it just took us almost two days to clean that thing out. But we didn't have to hire a place to stay. So, it was during that work over there that I got a telegram from Dr. [Hannah Marie 'aka" H.M.] Wormington at the Denver Museum of Natural History. That's what it was called in those days, They were going to do the excavation at Tule Springs, and, "Did I want to be the geologist?" I thought, "Ya!" (laughing). So, I dropped out of school again, and Paul Damon understood and so did John Lance. So that's when I went to work for the Nevada State Museum as the geologist on the Tule Springs project.

VS: Excellent, well we are going to get into a lot more, but thank you for that introduction. Reflecting on your career do you view yourself more as an archaeologist, or a geologist or something else?

VH: Professional pecuniary geologist and an amateur archaeologist, but I specialize in Paleo-Indians.

VS: Excellent. Did you have any training in paleontology?

VH: Yes, I took several of John Lance courses on vertebrate paleontology. And I also took invertebrate paleontology here in Arizona.

VS: Do you still have your class notes?

VH: I don't know if they go back that far, but who knows? I have, you saw those file cabinets downstairs. I have an equal number of them at home.

VS: I'm not surprised. So, 2016 will mark the 54th year since the excavation at Tule Springs Fossil Beds. What does Tule Springs Fossils Beds mean to you?

VH: Well, you know, at the time all of the hype in those days was that Tule Springs was evidence of man in the world, at least 28,000 years ago. And so that was exciting stuff and so I was, you know, by this time I had begun to appreciate the integration of inter-disciplinary studies. And, it was clear that, Tule Springs is going to be very inter-disciplinary study at a very important site and I had read everything that had been written about that site. All of Harrington's stuff, D. Simpson's stuff, and the Carbon 14 dating that Cult did and Libby did and Wally Broker, who is retired here now. And so I, you know, realized how important this thing was. So I had no hesitation. All my professors agreed it was the right thing to do as it was an experience we had never had.

20:07

I didn't realize how big a deal this was going to be in terms of what was done out there so, I arrived at that site in September '62. And there was a trailer out there with an awning and it was Peggy Wheat and Jim Calhoun. Were the only people there. It was a 110 (degrees) in the

shade. (laughing) And, Calhoun was the Director of the Nevada State Museum and Peggy was the camp house mother, so to speak, wonderful person. And doing a lot of ethnology and archaeology. Anyhow, Jim handed me this pack of maps and photographs and I looked at this stuff and here are these aerial photographs of the entire site area taken at low altitude, gridded at the 50, 50 meter grids. And the maps were one meter contour intervals. I mean you talk about being handed you know, heaven, (laughing) here's this. So the whole place was staked out on a 50-meter grid. So you know here's this map. This is what – that's what this one is based on here, from those photographs. And they had Patrons and Associations, a company in Los Angeles, do this topography. One of the people who came out there in this process was USGS Geologist called Roger Morris. Roger is a superb geologist. And Roger's first thought was "Oh, that can't be very accurate." You know? Almost like saying it's not USGS (laughing). Turns out, the topography was very accurate. It was very, very useful. So, you know you're handed this. You know, it's just manna from heaven.

VS: How do you feel about Tule Springs Fossil Beds being established as a unit of the National Park Service as a National Monument?

VH: Well the good thing by that is it is going to be protected from, it will be protected. So it is a research base that can be used hopefully forever. Because there was problems with people not only collecting fossils and looking for artifacts and things,. Even when we were there, on weekends, there'd be motorcycles coming through there. You know. And, then the liability became a problem as you know some of these trenches, Trench K was 40 feet deep in one place. I think Suther's idea was it would be, they go into one of these trenches with their motorcycle, it would be their own fault. Obviously that was a real problem and after we left the site I would go back out there every year or so just to see what was happening, and it was becoming a motorcycle obstacle course.

We backfilled many of the trenches, but there were some that we had kept open because it was still work we wanted to do. So, it was pretty well being torn apart. And of course, as you know this site, in those days. This site was 10 miles north of any civilization in Las Vegas. So, we were out in the middle of nowhere. I mean it was really rough. In the evenings we could get up in one of these inverted riverbeds, gravels ridges that inverted. You know, inverted topography is where you have an old river channel with gravels that are more resistant to erosion than the beds on either side. And as the land wears down the gravels wind up, what was the lowest area in the landscape winds up being the highest area in the landscape. And there's those little ridges are all through the surface out there. So where our camp was there was one of these ridges right behind us. You could get on that and look 10 miles to the south and see all of these lights going on. Back in those days the story was "Oh this huge bubble's going to burst. This can't last," (laughing) you know. Last it did.

VS: Very good. Do you recall how and when the name "Big Dig" was first used for the Tule Springs Expedition?

VH: The first I heard that name was when those preservation oriented people in Las Vegas had a bunch of us come out there. I don't think Erv [Ervin Taylor] came, but uh, I came out there and Margaret was there, and oh who's the guy who worked for Nevada State Museum? Anyhow

there was a bunch of us gathered there and they were calling it The Big Dig. That was the first I'd heard of it.

VS: That name wasn't used in the 60s.

VH: No, it was called the Tule Springs Project.

VS: Ok, excellent. On February 28th, the day before your birthday, in 1962, Willard Libby hosted a meeting in Los Angeles which led to the decision to begin work at Tule Springs later that year. It does not appear that you attended that meeting. Is that correct?

VH: No.

VS: But do you know anything about that meeting? As ultimately it—

VH: You know Dick Shutler was at that meeting—

VS: Uh-huh.

VH: —And, it was attended by most of the archaeologists in the Great Basin and the Coast, all over. And so, see now Libby at this time, he had received the Nobel Prize and he had moved from his laboratory in Michigan to UCLA and established a new carbon laboratory there. He became, I think he was the head of what became known as the Isotope Foundation. Which is a group of philanthropic scientists and businesspeople. I don't know whether it was Libby's influence or what, but I guess Hershel C. Smith. See Herschel C. Smith was a contractor and a very close friend of Libby's. So, what Libby did at that meeting, he said to everyone at the podium that "If you Archeologists will decide on a site that is of critical importance to American Archeologists that can involve carbon dating I'll devote full time of my laboratory, 24 hours a day if necessary to dating that site without charge."

Well, (laughing) everyone just fell out and you know after all the heads got together it turned out the Nevada State Museum was ok, going to direct this. And Dick Shutler would be in overall charge. But Jim said he would not take the job. This was one of the smartest things he ever did. He said, "I will not take the job unless we appoint a blue-ribbon panel, oversight committee of geologists and archeologists to evaluate what we are doing. Boy that was a very good idea. And so that is how this committee formed that was just filled with the top Archeologists and geologists in the nation, include Bill Benson who headed up the geosciences at the National Science Foundation.

VS: And that was referred to as the Tule Springs Advisory Committee. Is that correct?

VH: Yes, uh-huh.

VS: Separate from the one that has recently been establish that guides the Park Service

VH: Yeah there is a – and of course as far as I was concerned this is one of the best things that ever happened because I got to meet all these people. I had read some of these people like

Desmond Clark, I had never met him before and Heizer from San Francisco. A lot of the geologist I knew.

VS: Chester Longwell?

VH: Chester Longwell who was the grand man of geology back in those days. Basic tests was one of Longwell's things and he had mapped Las Vegas Valley.

VS: Uh-huh.

VH: But, I want to show you one picture here, it's when we had the (laughing) search committee out there, (referring to image). This is the committee in Trench K and of course OSHA would not allow—

VS: Lift it up so they can see.

VH: —There's no way that you could dig a trench 40 feet deep out there today and 30 feet wide (laughing). You know. But you're looking at, I think this is Charlie Hunt, here's Desmond Clark, this is Bill Benson, that's me and this is Jess Jennings the archaeologist from Utah and John Moby the paleontologist on the Tule Springs Project. Now where is John this day and age? Do you have any idea?

VS: He's passed away.

VH: Oh really, that's too bad, John was a very nice guy and this is Charlie was there. He's an archaeologist from the Nevada State Museum. Don Tuohy. So, rubbing shoulders with all those people was a wonderful situation. I eventually got to work for Desmond Clark over in Africa. That was my first time working in east Africa.

VS: These next several questions I think you've already answered well, but I'll ask them again just in case you want to frame them a little differently. Would you share with us how you became involved with the Tule Springs Expedition and when you were first contacted about the project?

VH: Well, my first contact was when I was working on Wendorff's High Plains project over in New Mexico, when I got this telegram from Dr. Wormington at the Museum of Natural History [asking] if I wanted to be the geologist of the Tule Springs project. And of course, by that time I had known pretty much about Tule Springs. It was one of the biggest, it was at the forefront of people's interest in archaeology. So that is how I got wind of it. So when I was offered this chance to be the geologist there, I jumped at it.

VS: And how would you characterize your role in the Tule Springs Expedition?

VH: I was essentially the geologist for the expedition. So whenever there is a geological question on any of the sites that were being excavated, I would be called in to help with that. But my main objective was to date, to define the stratigraphy, to map the stratigraphy on this space I'd been provided. And do the overall stratigraphy at the site but spending detail on individual portions of the site that were being dug. At that time Libby wanted Erv Taylor who was his laboratory

assistant to come out. He could come out to the site every day and collect samples and take them back. And the first thing I told Dick, I said, "Now Dick by the way, he got his PhD in Arizona, but he was a lab assistant in the first radiocarbon laboratory in the University of Arizona". He had some interesting stories to tell about that because that was the old solid carbon method and that was before Paul Damon was here. So, when Emil Howery, who headed up this department, wanted a carbon laboratory he simply called Dr. Weiso in chemistry and says, "Can you build a carbon lab?", and of course no one over there knew a thing about a carbon laboratory. Anyhow, they put this laboratory together. Libby sent them the counters and so Dick was an assistant in that process.

VS: Ultimately your work at Tule Springs resulted in your PhD dissertation.

VH: Yes.

VS: Is that correct?

VH: Yes.

VS: Would you share with us when it transitioned to become your life's project. When you decided it to become your dissertation project?

VH: Well, my dissertation was up to that point was going to be the geo-chronology of Sandia Cave in New Mexico because that was another Paleo-Indian site that had potential to be very early. Pre-Clovis and so this was an opportunity to get involved in that. But also to, radiocarbon dating became an important part. So, one of the things I had to convince. For example, Hershel C. Smith who is contracted. One of the ways was this heavy equipment got involved at [the] Tule Springs project was Hershel C. Smith, who by the way was a partner with Michael's son, Billy. Two silos around Tucson. He had gained a lot of wealth from buying surplus stuff from the South Pacific islands. Dick and I were taking him out over the site and his first comment was "When I got this heavy equipment to work with us," he said, "I didn't go to number 1 or to Alice to Caterpillar." He said, "I went out to International Harvester". But what he got was the biggest bulldozer at the time, the T55. And he had two bulldozer, and he went to Alice Charmers, and scrapers. One motor scraper and he got the Union out of Las Vegas to put up their labor free of charge. All they had to do was pay their compensation. And it turns out that Joe Wells, who owned the Thunderbird, was putting up, was bringing the fuel out for all this equipment and all the water. So, it was just incredibly situation.

The first thing Hersh wanted us to do was strip off all this top strata to get at the goodies you know. Dick and I we sort of worked on it and the two of us gradually. He took us to dinner one night at the Tropicana and we pointed out, you know these are like pages in the book of time. I said, "You know, what's above this stuff is just as important as what is in and what is below it, because that is how it works." And the next time he came out to direct all this stuff he just copied our words, "Now what we want to do is look at this, we don't want to strip all this stuff off". Well I had worked a time or two with Union operators and I knew they are engrained to make every minute count for their customer.

So, I knew if we hit anything with these bulldozers and had them stop they were going to be kind of antsy. So, I told Dick, "Let's go way over to the north end of the site and we'll put a

trench in." This is what became [known as] Trench K. So, anytime either one of these bulldozers or motor scrapers was held up, we'd send [them to] Trench K. And I said, 'You know, if we are lucky, we will get clear across the Washoe Ridge over to the fan on the other side. Turns out we did. Because the procedure was to have the crews follow, as the bulldozer bladed off. He tried to take off about ten centimeters, about four inches, and the crew would come along behind it and anytime anything showed up—bone, charcoal, anything like that—they'd stop and take the bulldozer over to the Trench K. Put a crew in there and start digging. And that worked very well because we had the crew working you know, the Brooks' were working on—I forget what they called it but its where that spring is.

Walt Stein was working in another trench. Walt by the way lives in Tucson. He was at the Big Dig, the first one. The second time they had me out there, see we were out there twice for these Big Dig things. So anyhow, he had all these different crews working and when the equipment was tied up we would have two trenches going at a time. But Trench K was always going. So, that's how we were able to sort of keep things under control. So, my job was to lay out level lines string lines in these trenches and map the stratigraphy which you know is all this, (rustling, presumable of the map referenced next) And by the way, I don't know how Dick did it, but back in those days to do something like this in color was very expensive. But somehow Dick got this stuff done in color and of course it makes all the difference in the world. That way you can actually show some of the sedimentary structure but you define that stratum by a certain color. So it worked out beautifully. On the map they – there places where they did an index of where the color overlaps the other, but unless you look at it real close you don't see that. So here again, this really fabulous opportunity to do this stuff.

40:13

VH: You know you're looking at a project was just enormous in size and back in those days we would have called segmented fans were coming in vogue. The USGS geologists had come to realize that if you look at the surface of an alluvial fan or a photograph you can see different colors and different segments of the fan. Those are different ages because what these are surfaces that get entranced. He had a base level and he had another entrenchment at another base level 'til you wind up with these surfaces that are different ages. Most of them are in the [unclear], the Pleistocene. So, this was another fabulous thing that happened with the project.

VS: During our conversations on the phone we both agreed that archaeologists would never be able to undertake something like the Tule Springs Excavations given the magnitude of them and all the opportunities for radio-carbon dating. So do you have any thoughts regarding the methodologies that were used at Tule Springs, in terms of the pre-excavation planning, the implementation and the results?

VH: The use of heavy equipment like bulldozers and motor scrapers is something that would never happen again, at least in this country. Because you know you're opening up a huge swath and even though you are taking a small bit off at a time. It's just not a good way to go. It wouldn't be, it just simply would not be acceptable in this day and age. The other thing is that with OSHA there is no way you could make unsupported vertical walls like we had in these trenches. So nowadays it is legitimate to use backhoes and a backhoe trench. You can do excellent stratigraphy off of a backhoe trench. As long as you're very careful about and that's the

other thing. You know I've been mapping on backhoe trenches from the beginning and one thing you realize early on is that you don't want that backhoe trench to get into the capillary fringe of the water table. You want to stay well enough above the water table because what happens is it starts to saturate the base and you can have walls slump in.

So, one of the things OSHA requires is supporting the backhoe trench. Well, you know if you support the way contractors do, you can't see the stratigraphy. So that doesn't work. So the alternative is to take away one side of the trench. So now you are tripling the expense because you aren't really digging the trench. But you are taking away enough of one side so that if a wall does collapse it is not as bad as being pinched between two walls. So, something like Tule Springs will never happen again in this country.

VS: We are going to shift a little bit to talk a little bit about some of the people. And you've mentioned several of those names already. One of the significant aspects of the Tule Springs expedition is the assemblage of the inter-disciplinary team that was involved. The specialists that were participating in the project. Why don't we start with Libby. Did you have direct communication with Willard Libby?

VH: See, at that particular time, and it's still somewhat this way today. Is that the radiocarbon dating is like a fraternity. Everybody that is in this group that does radio-carbon dating pretty much knows each other. Paul Damon of course is a part of that. And, Paul Damon was a student of Dr. Call of Columbia. Wally Broker was a student of Dr. Call. So, they would get together at these international radiocarbon meetings and Libby would, back in those days, be the big cheese at these meetings. So Paul knew Bill Libby pretty well. And I got to know him right off the bat because discussing what we are going to do about carbon dating. That's when I was, he told me he was going to have Erv come out on a 24-hour basis. I said, "You know that really isn't necessary." And the first thing I said was that, and Dick agreed with me. You know we don't want to date any carbon samples until we know exactly where they are in the stratigraphic framework. We just don't want to pick up a bunch of shrapnel. Erv fly back and date it and you know, wait 'til we get a framework established.

So, see he had formed this Isotope Foundation which had a head, some of the top geologists particularly in the California area involved and I'm trying to think of one of them. He was a geo-physicist from Harvard. And I can't think of this name right now. But so what it amounted to was Erv would come out once a week and collect whatever charcoal samples we had. Radio-carbon samples because we were going to try to date anything that was dateable. And then Libby would provide the date for us once those samples were back. He'd have a date for them back to us, back within 48 hours. And what that means is that he's giving you a very preliminary idea of the age (coughing) because when you date a Carbon 14 sample, you usually date it between dating standards and backgrounds. That's how you determine the age - a dead sample versus your standard. So, what he was doing was giving us the date calculated just on the first background standard. So, not until the second, 'til one was finished and he ran those background standards, could he average those two. If they were average-able. That was the other problem, if there was, if they were not within a standard deviation of each other then you got to do the whole thing over again. So this is why it was very important not to swamp with samples. So, the samples we sent were just when we needed a date we got it. We got a preliminary value within 48 hours.

VS: And so, my understanding is that you have about 80 localities that have dates for them at Tule Springs.

VH: Gosh, I haven't counted them up, there's a bunch of them.

VS: And then Ervin Taylor would come back each week, gather more samples to take back but also report on the sampling from the previous weeks. Is that correct?

VH: I think so. I don't know what that was a two-week turnover or a one-week.

VS: Ok.

VH: I think it might have been two weeks.

VS: Ok. Why don't we shift briefly to Richard Shutler—

VH: Dick Shutler?

VS: Yes, uh-huh. A few comments about—

VH: Ya, he's the one who, you know, became the Director of the Project. And who had as a student had been an assistant in the old sold radiocarbon laboratory.

VS: And then Charles Roseer, his role.

VH: Charlie was sort of, I would say, Dick's assistant. I wouldn't say second in charge, but he was sort of Dick's assistant. And Ruth Simpson she dug with us, very insistent. She never, ever agreed with our findings. (laughing) That's when I began to learn that some people believe what they want to believe. Doesn't matter what you find.

VS: And you can add a few comments to each of these names, any personal accounts as well. John Mawby?

VH: John Mawby was a vert paleontologist. I think out of Berkeley but I'm not sure. And a wonderful guy. And he taught, he was a prof, I don't know how to say professor, but he was a, what's that junior college in Nevada that's in a basin? This is a private school. The name will come to me some day, but it's in a closed basin in a remote part of Nevada. [Deep Springs College, California, near Nevada border] Where they educate hardship cases and people that need help, I guess medically, I don't know. But the thing is, it is a very orchestrated situation. You cannot leave that campus or that basin except Christmas. I think Christmas and summertime (laughing, unintelligible). And they had their own farm. They cooked their own food. They, it was a very interesting situation it was something I didn't even know about ‘til I got to know John. Eventually after the project, years after he invited me out there to give a talk. And I gave a talk on carbon-14 dating and those kids kept me answering questions for two hours. It was mind boggling, really sharp kids.

VS: And they didn't let you leave ‘til Christmas? Is that—

VH: Ya!

VS: How about Peter Mehringer?

VH: Pete Mehringer is a very close friend of mine, colleague. He's now in Norway. Pete, I think had been here maybe a year before me. But at any rate, he had started out in entomology studying insects. But he had gotten enamored; he had gotten to know Paul Martin and got to doing pollen. And between Paul Martin and John Lance the geologist, he got very interested in geology. Doing all of this in conjunction with archeology so Pete and I hit it off right off the bat. So I started doing work in Arizona. Talking to Howery, turns out that there were some improvements that could be done in dating the Lanier site and Howery was all for it.

And we had gotten to know Ed Langer who is one of these remarkable people you know Reader's Digest says in articles about the most—what was it? I've forgotten the title—the most unforgettable person I have ever met. Oh, Ed Langer would be one of those. Because Ed was one of those, he was, his father was from the old country; Germany. And Ed got a degree at Colgate in animal husbandry. Got into World War II when he saw it coming down the pipe because he wanted to be in the calvary (laughing). He got into the calvary before Pearl Harbor and he's has amazing stories about shoveling out stalls at Fort Robinson, Nebraska. Anyhow, so we opened up a trench at the Lanier site and you know Ed was all for this. Howard was too, so after Pete and I got to know each other and when we saw that black layer there at the Lanier site which became the black mat. We were wondering if there were other places in the valley that had that, so we started checking arroyos up and down the San Pedro valley and we were finding black mat all over the place and that's eventually how we found Murry's Springs.

VS: Excellent, You know Paul Martin?

VH: Paul he's from Pennsylvania originally and another remarkable individual. Who had come to Arizona to work in the geo-chronology laboratory as the paleontologist, and taught paleo-zoogeography, zo geography and so, I, you know Pete and I took his courses when you wanted to take. Pete wanted to take the basic pollen course, so I thought, “I'll take it too.” Because one of the reasons I got back into college, because I wanted to know the limitations of some of these like radio-carbon dating, what are the limitations?

Back in those days pollen was becoming a big thing at archaeological sites and also paleo-archeological reconstructions like the High Plains project in New Mexico. So, I wanted to learn about pollen. So I wanted to take Paul Martin's course which usually required having taken, biology and I forgot what they called, but plants. But Paul didn't want to teach it that semester, so it was another guy who wanted to take that course. So the three of us twisted his arm and he decided to teach it. And it was all taught up in Dumock Hill and back in those days his assistant was a man named Bernie, Bernard C. Arms. And so, we essentially became, Bernie was the one who did the actual teaching us how to extract pollen. One of the things that blew me away, I didn't know at that particular time, that in extracting pollen they used hydro-chloric acid to get rid of the rocks in this sample of sand grains. I thought “Wow! This could work, carbon-14 dating and get rid of all that stuff.” Anyhow, so Pete and I took the course. Pete went on to take others. So, when the Tule Springs thing came along Pete was the obvious one to have the pollen

there. And then of course Paul Martin was one of his advisers and so he became an advisor on the Tule Springs project, along with John Lance.

VS: Excellent. Margaret Liness?

VH: Margaret was one of the student helpers on the site and she eventually went into a project of her own working on the surface archaeology of the Tule Springs area. So, from the site all the way down to what we called Eddington's Scar and from the wash to the west. She surveyed that whole area and did her part of this on that.

VS: Are there any other names in the Tule Springs Expedition that you'd like to share a few thoughts about?

VH: Well I think I have covered most of them. We had, of course, Peggy Weed, who was the house mother there. She was, you know they built this uh, it was essentially a shack, it was a well-constructed shack with plywood and she became the cook as well as the camp manager. She was a wonderful person. As I told you, she was an ethnographer because she had been working with Paiutes for years. She was also as a field assistant for Roger Morris. So, one of the interesting things about Peggy was one day, early in the day, Joe Wells sent a thirty inch auger truck out to make auger holes for me. And I told him, I said, “You know, I don't need those I would love to have them at the end of the expedition to check some of my underground projections. But I just don't need it now”, and Peggy (laughing) she, spoke up and said, “Vance, we need Latrine pits and trash pits” (laughing) so we went to one of these inverted hills and put these holes in so at the end of the expedition the auger came out so I put in augers all the way from the site over to the Tule Springs resort to check on these alluvial beds.

VS: We are going to come back to Margaret in the second set of questions but I wanted to ask you in hindsight do you think that there were any individuals at the time that should, or could have been part of the Tule Springs Expedition that were not?

VH: Gosh, not that I can think of. And of course, that research committee, there were all kinds of good ideas coming from these people because you know they were world authorities. Charlie Hunt he's the one who, see one of the things that turned out this sample at this site was, what Harrington was calling "fire hearths". One of the problems with that was, when I started sampling this and working with the charcoal, I had brought the chemicals with me from my lab to pretreat these samples. And every time I would pretreat this charcoal. You know when you pretreat this stuff you hit it with acid and get rid of the carbonates and you hit it with base and [unclear]. This stuff was going into solution and so it's not solution, so it's not charcoal.

I mean charcoal is an elemental carbon, you know it's burned and very resistant. You know you can put it in con-acid and it will sit there. So, this stuff was going into solution. So, I told Dick, "You know this isn't [unclear]” And it was in this mound that Brooks was digging and so here's this lens so you can see why this looks like a hearth. One of things that [unclear] were puzzled by was these snail shells in the hearth. You know they weren't burned. Turns out it's not a hearth. What it is, is the organic detritus in what I call a cauldron springs. It is a spring that shaped like a big bowl and you (60 mins) have a feeder coming up that's filled sand and the sand is very well sorted because it's roiling water. And what that's, what these springs are doing is they are,

filtering out the fine grain stuff but there's organic stuff growing around it. And as the organic stuff dies and gets waterlogged it sinks. So, in this bowl you have these coatings of organic matter that eventually oxidize becomes black. So, if you cut that mound, here you are with this hearth shape thing. So, they weren't hearths they were natural deposits.

VS: We've got a perfect break here. We have to change the tape. I don't know if you'd like to take a break and stretch your legs or keep going.

VH: I'll go check my mail.

VS: Ok, well check your mail, and when we come back um, this is going very, very well, thank you. Couldn't be better, I still have a few additional questions. Maybe take about 30 minutes then I'm going to turn over to Jeff and Kathleen to pick your brain geologically.

VH: Ok.

VS: Great, thank you.

Other voice: Dr. Haynes? Um, it's Deep Springs College.

VH: Deep Springs College! That's it!

Other voice: It's actually California, it's just, it's near the Nevada border and—

VH: Ya, that's right, that's a remarkable place. Jeff have you ever been there?

Presumably Jeff: No.

VH: It's amazing, you have these springs coming out all around this thing so you have (voices loud in background) scads of little micro-ecologies with algae of all kinds of colors and snails and, (laughing).

VS: Well, thanks. Thank you very much.

(laughing)

[At 1:02:01 group breaks and appear to be discussing the format of the rest of the interview. Vance appears to have left the room. Note: transcription doesn't include the content of this meeting.]

1:10:10

VH: You could do the geology without those trenches by looking at the natural exposures. But this is, the trenches give you a whole better three-dimensional look at the stratigraphic sequence up there. And one of the things, that particularly [strata-me?], what I think is what I call [unclear] is [unclear] deposit. There's a lot of carbonate nodules and things in it. It was one of my former students, who's now a professor here, Jake Quaid that realized these things that look like calcium carbonate big noodles, were actually cicada burrows. So there was paleo-ecological information in that stuff. So, he picked up with that and he ran with it.

VS: So, Mark Harrington's role in the Tule Springs Expedition was more as a consultant?

VH: Yeah.

VS: Informal, formal? And your interactions over your career with Mark Harrington can you share a little bit with us?

VH: Tule Springs was about it. It was with Dee Simpson that I went on to have, she started to digging the Calabo Hills thing you know I got involved in that.

VS: Ok. So, I think Kathleen's going to talk to you a little bit about the Simpson.

KS: Ya.

VS: Ok. Alright, so what we are going to do now is we are going to have some fun. We are going to shift gears a little bit. We are going to pretend like we are doing an ethnographic study of the Tule Springs Expedition, all aspects of it. On December 16th, 1962, the Tule Springs Expedition Camp was open for business and I understand that there is a reference that is made to that camp as Camp Harrington?

VH: I think so.

VS: Ok, so in many ways Harrington was part of this—

VH: Oh yeah.

VS: —this expedition.

VH: Well this expedition was testing his hypotheses that he had come to and you could see why he had come to them. Many of those earlier paleontologists that had found a city, [unclear] that was the first clue that humans might be involved with these extinct animals. So, Harrington and the Southwest Museum, the ones who did these excavations and got Cole interested in carbon dating and Wally Broker. I think Phil Wor worked with them for a while too.

VS: Ok. So, I'm going to have several questions from an ethnographic perspective. Can you share with us what camp life was like when you weren't working in the field?

VH: It was very interesting. We were in tents and there was a trailer, was kind of the office that Dick sometimes occupied. And if we had guests who were gonna stay overnight, they would stay in the trailer. We had Roger Morrison with us there for several days, if not weeks. And of course with this committee coming through periodically, I had a lot of brains I could pick from looking at this and Charlie Hunt and his wife Alice is an archaeologist. So, he was working in Death Valley in that area and he's the one, when he saw where we had cut the spring cauldron with the feeder at Brook's site with these carbon things in it, he's the one that told me, “You know there are living analogs of these springs at Ash Meadows over in the, you know in the other farther over towards California border and Nevada.”

And so you know urged me to go see those. So, Dick and Pete and I think Charlie. Every weekend at Tule Springs you were off. You could do whatever you wanted to. And so most of us would go off and do one of the things. But one weekend we went to Ash Meadows and one of the springs there is called Crystal Springs. It's an active spring just like this thing Brooks had. Here's this huge pond about the diameter of this room, this wide. It's on a raised mound with a vegetated lip. And so the water just seeps off this thing and the water is just crystal clear. You look down and you can see through that water and you can see this conduit down at the bottom with this roiling sand. And if you've gotta ax you can put in there. It is just mesmerizing. And then there are little pupfish swimming through this thing. So, this was a real eye-opener that Charlie put me onto. It was really, really fascinating.

And Pete too. And then I started looking at the desert game range because there were spring mounds there. There was none this big. But there was one open spring mound that had a pond and the pond was about the width of this table. So, I went one of the times with Erv Taylor, I took him up there and showed him this thing. I think there's a picture of it. It showed part of the, you know these springs are active. And then when the hydrologic pressure subsides the spring starts to discharge less and less. It starts to fill in. And eventually you may just have a vegetated mound. But, before you get to that stage you have a very shallow pond that has mud in it. And in this picture, if I can find it, you can see this little area of mud that's still roiling. And around it you see this little black layer. What that black layer is, is vegetation. It's just a miniature of what this whole thing is. And just for the hell of it, I thought, you know, so I put my hand, bent over and put my hand down in that thing and I said "Yah!" it's a conduit within this. Cause this much of the big conduit filled up with stuff settling. And I felt something and I pulled it up. It was this [unclear] of a horse (laughing). Some rancher's horse a young, young horse had gotten into this thing. So here is a miniature example of what's going on in the past at that site. So ya, that was a great experience.

VS: Excellent. So, we are going to check your drawing skills. Do you think you could diagram as best you can remember what the camp looked like? The configuration of tents, or where the mess set up was? This would be fun to do because the area is part of a National Register Property and the park knows exactly where that site is.

(silence)

VS: It's on the state section. On and off, close.

VH: Ya, you know I baptized that shooting range out there.

VS: You did? Oh no! That will make you an accessory to a crime (laughing in back).

VH: When I was at the Colorado School of Mines, in 1960, I was fascinated with cannons. There was two of them in the plaza in Albuquerque, New Mexico that were part of Sibley's Confederate Force when he invaded New Mexico. So, I just fascinated by those things, so I studied them and made a pattern and had a foundry in Denver cast this thing.

VS: Wow.

VH: And the first time I ever fired it [was]on the carriage at Tule Springs. So, I brought it out there and so we all got up on one of these, one of these inverted stream beds. I had everybody get behind me and my charge was a mill ball. And the way I got those was, being at the Colorado School of Mines, I called Colorado Field and Iron down in Pueblo. I said, "You know how uniform are your 2 inch mill balls"? And the guy says, "Well how many tons do you want?" And I said, "Well I want to know how uniform they are?" and he said, "Well will a 50-pound sample be ok?" And I said that would be just fine, and I still have some of those left.

Anyhow, I made these little wood shoe samples with these things and the powder charge was about the diameter of a broom handle. And anyhow it got that thing out there this one morning and fired that thing. I could see the sable far away. But, I couldn't see the ball. And we waited (01:20:02) and I thought, “Well fool you shot it in the wash.” And then way up on the fan (laughing) you could see this dust cloud go up. That thing had gone over a mile.

VS: Good thing we know this because the archaeologists that are working there in the future are going to really wonder about the [unclear]. You mentioned you still have some, would you mind donating one for the potential future exhibit at the park?

VH: For a small charge, Ok. (laughing)

VS: We will make that work.

VH: Yeah, I think I've read it again but I noticed it again, the axel with the half inch iron rod. And I fired it because the cannon, it kicks back.

VS: By chance do you have photographs of that event?

VH: I have photographs of the cannon on the hill somewhere.

VS: That would be great to get a copy of.

(UK): And do you still have the cannon?

VH: Oh ya. But it has a totally different carriage, 'cause that was a Mickey Mouse carriage.

VS: Sure.

(laughing by people in room)

VH: Ya, but that, no as for the camp if I could, maybe if I look at the explanations in this table, go back (rustling of papers). I just don't remember.

VS: And so, can you orient north, south, east, and west?

VH: North would be essentially that way. Dick Brooks’ site would be somewhere right over here.

VS: Ok, and where would your tent be?

VH: Hm?

VS: Which tent was yours?

VH: I think mine was probably this one.

VS: Could you just label that as your tent? And then do you do know who was in either of these tents?

VH: I think Charlie Roseer was here, Dick, this was Dick's. This was Charlie's and this might of been John Mawby's.

VS: Ok.

VH: And there was somewhere right in here there was a generator.

VS: Can you just write generator there and the name of the people for the tents?

(silence, presumably looking at map)

VS: This was the mess and that was a trailer?

VH: Ya.

VS: So, did you have a shower set up?

VH: No.

VS: No?

VH: I think there was, think in one of the stalls there was a solar. You know I'm just not sure of that. I've been to so many camps now I get them mixed up.

VS: Are these the latrines here?

VH: I think those are trash pits.

VS: Trash pits, OK.

VH: Ya. And see, one of these, one of these things is one of these ridges—

VS: Uh-huh.

VH: —Then there was another ridge out in here. Maybe it went this way. Because I remember it was in here we would get up to look to Las Vegas. Which would be looking south. So it had to be over here, so we would be looking that way.

VS: Ok, so that would be north. Could you just put an “N” there so we have all that? Any other landmarks of interest?

VH: Well I'm trying to figure out the trench situation here, because some of those trenches you could still see where they are. Ok, this is Brooks' site I think right now. Now I wish I had picked the camp longer.

VS: What was the trailer used for? Storage?

VH: It was an office.

VS: Office, Ok.

VH: Ok, it was QE that are these ridges. So, it is over here, which is this stuff. That's too general. There are, there were [unclear] here. So, this I guess is the campus somewhere right in here. Campus somewhere right in here.

VS: Did you have a campfire that you used periodically?

VH: Yes. Now I've forgotten where that was. But what Dick and Brooks were doing was, they were experimenting. They would go in town to the butchers and get cattle cow balls and bring them out. And they were trying various things, like burning them. See but they had to throw them in a fire and uh, experimenting with breaking them. Because one of the things that occurred around, particularly this spring, the thing Walt Stein was working on, which was over here. Look out (coughing). That was another one of these springs that the trench goes in cross section. Once he came down on it, all around it, it was just huge masses of bone fragments and a lot of which could be mistaken for tools.

In fact, originally, they thought these were tools. Until you begin to realize that these are watering places for all these game. So everything is, the guy who is the expert on this, of course he probably wasn't born at that time, Gary Hanes over at Nevada. And Gary studied this kind of stuff in natural environments in Africa. And so what it boils down to is this is just the typical debris of animal bones and fragmented animal bones that we find around a watering hole. All of that stuff is curated at the Nevada State Museum. I always thought would be a very good Master's Thesis for someone to go through and study all that stuff, using Gary Hanes's input to it. You know, it's 35,000 years old, or older.

VS: Right. So, can you describe a typical day at Tule Springs? Differentiating the work time and your time off of work?

VH: Most of it was the crews would go out in the morning. I don't remember the times but it was pretty early to get started digging in their various places. Gosh, if I could just think of his name, he dug in [unclear] which is this one that, I guess is labeled as one here. It might even be off the map. He stayed on and he worked at the Nevada State Museum for years after that. I can't think of his name. But anyhow, you know he would get his group going down here and Brooks and Sheila would get this stuff going here. Margaret for example would be out doing her surface survey. And Walt Stein out working on what I think I used to call Valley 5. But at any rate, and at various times during the day, we'd come into the cook shack to get lemonade or something like that, water. But most of this time what I was doing was working in these trenches and once I was starting breaking a trench, I didn't stop. I just kept on going. And so, this was a routine that went on daily. Then on weekends we would often have visitors. And very often they were Search

Committee so we would spend pretty much all Saturday, for example showing them the sites through the trenches and things. Then on several occasions they wanted to hit Vegas Saturday night. So, Dick and I would go in with them. And, you know take in one of the shows there. And then good old Joe Wells gave us a room - right across the street was the Thunderbird, which was his hotel, which wasn't called the Thunderbird Hotel. I forgot what it was called, anyhow he gave us a room there all the time. So it was never occupied by anyone. It was for us. So, you know we were there 'til midnight. We could just go crash in that place. And that was kind of interesting because some of the other rooms had the cast of whatever show was being put on in town. So, when they were doing South Pacific I could, "Gonna wash that man right out of" (Laughing). Them practicing all these songs, that was pretty cool. So, I thought, "We gotta go see South Pacific." That was great.

VS: During a typical workday, how many hours would you and others work? Were you on a schedule? Or did you basically just put in lots of hours?

VH: Well, we would all be you know, uh, breakfast time was after dawn. So say from eight we would just work until, and if something was really hot they were working on, we just kept at it. Working hours – there wasn't a time we set to quit. And at any time, anybody that felt any kind of problems with too much heat, or anything like that, they would just go see Peggy. You didn't have to work.

VS: Did you have regular scheduled meetings, project meetings, team meetings?

VH: I'm not sure that they were regular but we did have get-togethers in the evening in the mess tent to discuss anything that would come up.

(Background: Excuse me (music in background)

VS: Sorry 'bout that.

VH: In fact, there was one, I guess it was the first visit of the Research Committee. Where I decided to show them how this charcoal wasn't charcoal. And so I hit this stuff with the hydrochloric acid. I put a sample in the test tube and washed it. And Bill Libby's there, and hit it with a base (laughing). It didn't go into solution. I had done this at least a half dozen times and none of this stuff was charcoal. And this piece did not go. It gave a little brown color but it just stayed there. I thought, "Well folks, there's always exceptions to every rule." And that was interesting, because Heizer, who was the big wheel you know from San Francisco, he was a close friend of a chemist there. I can't think of his name. Could of been Schwartz. And, he said, "You know let me have some of that. I'll take it to him and see what he says about it." And in the meantime, Marie Wormington had told me one of her professors at Harvard was [Dr.] Elso Barghoorn who was an authority on plants and fossil plants. And at her suggestion I sent some of this to Barghoorn and he wrote back and said what you have here is naturally oxidized. It's not burned. It's become so oxidized that it's approaching being lignite. [unclear]. But it hasn't been burned. So it's not a charcoal. So that was a very interesting experience, a learning experience.

VS: Back to that ethnographic assessment of the campsite and the team. Were there any camp practices, rituals, routines that you can recall?

VH: Not really. One of them was this business of one night when they had a big bonfire, took burned the bone and everyone sort of participated in that. And you know there was no rule against alcohol. So beer was, was fairly prevalent. Although, I don't remember anybody going too far with it, except one time (laughing). One weekend Charlie Hanson said we could go up, we wanted to go up to Thunderbird Lake which is a big dry lake up beyond the game range. It's actually in the test site. But it comes out of the control of the Desert Game Range. So he said one weekend we could go up there. So a whole bunch of us went up there and we made camp. We camped out. And, we were having a pretty good time and it got dark and next thing you know we could see this light. And you know, there's nobody out there. So, we went hmm? "What's this light all about". Pretty soon the light went out and finally somebody said, "Somebody's walking up here."

So we, everybody started putting things away. Tried to be as innocent looking as possible and this shadow walks in. It's this guy and he says, "Hey, my generator quit and I need some help." Turns out this was a guy and his family who had a lease from the Air Force to pick up 50 caliber machine gun shells for brass. That's the gunnery range. So all through World War II and right on up until today that's a gunnery range. Well, nowadays a lot of the casings are recovered in the aircraft. But in those days, they were just, you know as the machine guns went out you know they fell out. So, the place was scattered with these 50-caliber machine gun casings. Although I found some that had gone off. Another hobby of mine is cartridges, but that's another story. But anyhow (laughing) we were very relieved that this was not any officialdom. We can't even tell what got him started. And I asked him, "You know you're making a living at this?" and he said, "Ya." I don't know what brass was bringing in, but he was collecting it by the ton. Amazing, yep.

VS: So you mentioned Margaret Wheat as the camp cook/superintendent. She made three meals a day for you?

VH: Sandwiches for lunch, I think maybe we made those for ourselves in the kitchen. I don't remember now, but I think so. We didn't come back for lunch. You could, if, you know. That thing was very flexible. But in the evenings, she had a meal for us.

VS: And she took good care of you.

VH: Yep. And people would take turns washing dishes and helping her in the kitchen. So, there would be a lot of time when you would do KP with Peggy.

VS: And did she do some first aid for some scrapes and scratches?

Yep. I think so, I don't recall any but I know she did that.

VS: No one was injured through the course of the expedition as far as you know?

VH: Not seriously, Pete Merringer sprained his foot. Pete used to be a football player and he was also an early, early SEAL at the end of WWII. When Pete was walking through Brooks' site he took a wrong step and went down crash and his comment was, "And for my next trick" (laughing). And he got up and limped away.

VS: So, you mentioned seeing the lights from the Las Vegas strip from Tule Springs. Do you recall any conversations or discussions relative to the lights?

VH: Only the effect that uh, what dichotomy it was from where we were and what was going on over there. It was pretty. And you know, discussing whether this bubble's going to burst. You know it was, one of the things that I, a lot of us were fascinated by the whole gambling industry. Cause in those days any of those casinos, you were being watched all the time. And back in those days there were actually humans up in the ceiling watching you. Nowadays it is all done remotely, but a central room. So, when the movie *Ocean's 11* came out, they had to go see that. That was very interesting.

VS: During your time off at camp were there ever any card games, poker games, to pass the time?

VH: Not that I can remember. But, it wouldn't surprise me. And, now see one of the people we had on the crew was a chap named Phil Jenny and Phil was a geology graduate from the University of Wyoming. He was from Wyoming and, Phil for years became a sort of professional site bomber. Wherever someone was digging on a site that was early man, Paleo-Indian, Phil would volunteer. So, he was a volunteer crew member at Tule Springs. And when I was working in the Helga outfit, of course him being from Wyoming, Helga being out in Wyoming, I tried to get Phil to help me, to come out and be my field assistant. So, I wanted him to use Helga as his thesis or dissertation but he wouldn't do it. He just didn't want to take responsibility for those. And so, I've known, I knew Phil for years on one project after another. He'd volunteer to work and he was very good. But one of the things we noticed that whenever we had civilian visitors come to the site.

1:40:20

VH: Phil was always great at telling them, at taking them around and telling them what was going on. And on weekends if most of us split, Phil would stay there to welcome people. He would show them the sites. So, it was after that when he applied for a position at the Park Service and Dick and I thought, "Phil would be ideal for this." And he was dying to be stationed out West somewhere you know. So, he got the job. You know where they put him? Roosevelt Island (laughing). So, he was a Park Service rep at Roosevelt Island for decades.

VS: Wow.

VH: He could never get back West.

VS: Interesting. Do you recall celebrating any holidays, Christmas, New Year's, or birthdays at the site?

VH: I don't. I just don't. I do know that we would, there was these weekends we would take off and go. In fact, one of the other things we did was Pintwater Cave. Once we got wind of that and Dick and I went up and checked it out. Hersh Smith decided that he would, he would help finance an expedition, a testing of that shelter. And so here's Hershel C. Smith, he's in his 80s and he's flying around Twin Beach and he's a very good pilot. He had been an early airlines pilot. So, he got permission from the Air Force to land. There was a dry lake there just below Pintwater

Cave to land at. So after we got serious excavating, Charlie took charge of that. And so, Charlie and this even after the Tule Springs project. He could tell you worked at Pintwater Cave. And one time when Hersh took me up there. Hersh would take me up and explain so I could see the site.

But, you got to keep your eye out for jets, because there are jets going from Nellis to the shooting range. So, I started to look and I said, “Did any jets come?” Of course, if you saw a jet by the time you even began to tell him about it, it's over here. Over here you know. So, flying with Hersh Smith was kind of interesting. So, one day when he takes me up to Pintwater Cave he says, "You know I didn't get permission to do this today, so I'm going to stay below their radar" (laughing). So, we're cruising along and there's a ridge, big limestone ridge that comes out between the Las Vegas Valley and Nellis and, I mean the Indian Springs area playa.

So, we go over that ridge, and I had my hand outside. I could have picked leaves off the vegetation that day. It was something else. Then he'd land on the playa. So of course they had driven in, so they'd come out on the pickup, pick us up. And to get to the cave you had to go up with a rope. You know you could hand climb, but to help you there was a rope. And we actually had the archaeologist from California, I can't think of her name now. It'll come to me. She in her advanced years went up into that cave with that rope. We had [when]coming back down again, we had to help her so she wouldn't slip.

VS: So I have two more questions in this round and then we are going to pause for a minute and we are going to let Jeff and Kathleen come up and ask some questions specific to geology or anything else they want to ask. So let's see, the first of the last two questions. Do you recall if you experienced any weather or any storm events during the time?

VH: Oh ya.

VS: Ok.

VH: There was one windstorm—some really windy days. But there was one of them where it blew the girl's tent down. I think a couple of the tents went down and their stuff blown all over the place. And Norma Noble, one of the ladies in the tent, had her draft of her dissertation. And the wind blew the pages of that draft all the way up in the Sheep Range. It was a major disaster. I think she later worked for the USGS. Out of Denver. I think Estelle Leopold was one of her advisers.

VS: And then the last question before we take a quick change of seat. Did the Tule Springs Expedition receive much media attention at the time of the fieldwork? Did you have visits?

VH: Not really. I don't remember any video going on out there. But, I think I mentioned this one reporter from Las Vegas who came out there and interviewed Dick one day. And he just kept pressuring Dick to, the purpose of this expedition was to see if the evidence for human occupation of the site contemporary, contemporaneous with the extinct fauna was valid. And what we were finding was that it wasn't. And this reporter did not want to hear this. So he was really giving Dick a hard time. And finally Dick said, "Well you've got your mind made up, just go". And he came back the next day, and in the cook shack we had a cork bulletin board. He

goes up [to] the bulletin board and he pins a lemon hanging on a string on the bulletin board and he walks out (laughing) so I don't remember much of the PR stuff.

VS: Thank you.

(Rustling, voices in the background)

JP: So, Vance, I want to talk a little bit about the chronology and the geology —

VH: Ok.

JP: One of the things that's always impressed me is really the early stage of doing carbon dating. 50 years of people working on this type of dating technique for you know, improving it. Smaller samples better precision and all that kind of stuff. But really what you guys did has held up over time extremely, extremely well. So can you talk a little bit about, in terms of the radiocarbon dating itself. Back then how far you could get back? What kind of materials you were targeting, how plentiful they were, things like that.

VH: Well, as I said earlier the Carbon-14 thing was, instead of trying to hurry up and trying to do a lot of Carbon-14 dates, anything that was dateable we decided to do it so that every sample had stratigraphic problems. Very close problems. Now back in those days to do a radio-carbon date, you needed essentially a teaspoon full of pure carbon. And we were finding that in some of this organic matter that was accruing in these springs, you could get that. And the stuff, as you probably know, looks for the world like charcoal. I mean that (noise in background, can't hear answers). So, I would try to collect this stuff from specific portions of the site, stratigraphically that particularly um, you know first of all we wanted to start getting dates so we ballpark [unclear]. And so, as Erv would come back with these dates, we would just maintain a [unclear] maintained a log of every day, every sample. And some of them, of course I took back to the laboratory here. So I did some of the dating here.

JP: Ok.

VH: And one of the things that we found at Tule Springs that was very interesting and fairly new to my experience. I had seen tufa in springs around here in Tucson but out there by over what we called Eddington's rock there were these [unclear] of tufa, springs you know. And, so, I collected some of this stuff and in fact when I was defending my dissertation one of the things that I pointed out was that these were tuffas that actually wore molds around plants. So you could, if you saw a triangle, you knew that was [unclear].

1:50:00

And one of my advisers questioned me, “How do you really know about this” and so forth. So, I, cast latex in a bunch of these things. So I could show them the things [unclear] breaking them off. And so, they were convinced. And it was also at that time that I always wanted to date the organic fraction of carbonates. And trying to do that is almost hopeless by [unclear] you wind up with this ick, brown ick, that just mixture of everything, There was a guy at the USGS back in those days, even before Tule Springs, I had been working on the Dent site and a guy named May. In Denver, they had published a little thing called, "Dating Bone by Pyrolysis" [unclear] And

date that, rather than pyrolyze it and wind up with this brown ick. Trouble is when you do that, is that the humic gases get pyrolyzed too, Anyhow, when I wanted to date these tuffas I started pyrolyzing them and noticed that some of them turned black, I mean, really black. So, in my classes I had this piece of sort of [unclear] tufa that I broke it off, half of it and pyrolyzed it. So, here's this cream-colored piece and here's this black against it.

JP: Yep.

VH: So, I had started dating some of the tuffas that way. The dates aren't all that meaningful because both of them are contaminated to some degree. Probably, I'm assuming now. I don't know anyone who's ever worked with this but, the organic fraction of tuffas is probably algae. It's certainly biological. So whereas the carbonate were not picking up the hard water [unclear] dead bicarbonate. The algae are probably picking it up less, to a less degree. So, it's been fairly consistent is that the black carbonate should [unclear]. Carbonate should have gone with it.

JP: The carbonate fraction?

VH: Ya.

JP: So back in those days how far could you go back with radiocarbon dating?

VH: They said that you could go back to 40,000 but that was a stretch.

JP: Uh-huh.

VH: About 30,000 was about it. And you know when they got that second date they got from Tule Springs, I think Wally Broker did that. Part of the sample had come from that trench to the southwest where we had the Holsein channel.

JP: ‘kay.

VH: So, there's charcoal that was probably Holsein 12,000 radiocarbon years. Somewhere between 11 and 12, and then stuff from Brooks’ site which we know now is more than 40,000 and some so it was combination of those two that gave that finite date of 28,000 or something like that.

JP: Gotcha.

VH: You know the first date was greater than 28,000—

JP: Right.

VH: —And then they finally got a fixed value date. But it was a mixture.

JP: It was a mixture. And did you target bone at all? At that time?

VH: Not really. Bone was pretty hopeless. Now I did—forgot who was in the carbon lab then—I did a carbonate date over at that spring mound at Brooks’ site where this stuff was 40,000 or so, there was a channel that comes through it, that I think is younger.

(affirmations in background)

VH: So, the bone out of that channel gave a carbonate date that was considerably younger than the bone coming out of that spring. So I thought that probably is that channel.

JP: Yep.

VH: I could never get any charcoal out of that channel, but I did – I went out there in 1984. There was a big SAA meeting in Vegas in '84. So, I went out there sometime during that meeting [unclear]. And, I don't know what it's like now, but those days, you know Brooks' wall that cut [unclear] is still there. I noticed charcoal coming out of what I think was that channel, so I collected some of that stuff. I still have it, I never dated it.

JP: Really?

VH: Ya. I haven't even tested to see if it was [unclear].

JP: So, when you first got out there, I mean one of the things that always strikes me when we go out there is how big the site is, how complex, how subtle the different features are. When you first got out there, what were your thoughts? Was it an overwhelming type of experience or was it something you could just dive right into?

VH: When I first saw the situation I could tell this wasn't going to be you know, mapping one of the arroyos out there.

(affirmations from people in room)

VH: But that's why I just, convinced Dick that we could not go stripping this stuff off. That would be a total disaster. So that was important, getting that settled was very important. And as you know any site you work on, you're never satisfied. I mean there are things that I'd still like to do out there.

KS: Did you actually pinpoint where you wanted the trenches? Was that your call?

VH: Between Dick and I, it was where, you know on the surface, there were exposures so we knew to keep the trenches away from that but a trench there. So, that was a way we were selecting where to put those trenches.

KS: Ok.

VH: Kay was the one to put everyone to once they were tied up.

KS: So, the original grid was presented to you and then within that grid you chose.

VH: Ya.

KS: OK.

VH: Ya. And for years you could still see some of the grid stakes out there.

JP: How long did it take you ‘til you started to get a handle on you know the numbers of, different you know what the units were. What they represented, how many there were? Things like that.

VH: Well I could see the early stages of the trenches. I was mainly looking at the arroyo walls. I could see this, this was not simple. It was complex stuff whenever these, I guess [unclear] it has that green look to it, you know? So right there you are probably dealing with a wet ground, a spring, maybe. So, we kind of sort focused on those, because that's where we would expect to find stuff. But, as the trenches developed things became a little clearer because you could see how those things related one to the other. Also, I noticed. I guess going down, down the wash and looking back at the bank on the right bank, there were some pretty good evidence of a fault, of a pretty late fault. So, I started keeping an eye out in the trenches for that and sure enough there were a couple places in the trenches where things were [unclear] a little bit. So one of the biggest problems was dating that deposit that Pete and I thought was, we called it "lake" and uh. We were challenged on that by, oh what's his name? Jake's friend.

JP: Marty?

VH: Ya, Marty.

JP: Marty Eklund.

VH: And so, I said, “Well you know I augured those beds go all the way over the rancho.” (laughing). And Pete was telling me that you know. So we are getting, so we were getting tufa here and we're not getting tufa, so water goes up. You may get to a point where it's too deep for tufa. So he was telling me this. So, one of my advisers was oh what's his name? The hydrologist from Nevada. Very famous, he did a lot of the work in the Las Vegas Valley. He was pointing out that because one of the early reports[unclear] that there were no shore features. And, it eventually became apparent that what we were dealing was, was more of a swamp [unclear]. Not a big, you know sustained lake, where you had deep water and shore phenomena [unclear]. So, then of course Jay's take on this stuff was very helpful.

(affirmations)

JP: So then, so then the area around Tule Springs was obviously your focus, how far afield did you go you know in terms of putting everything in context?

01:59:59

VH: We did some work up in Corn Creek because there was a lot of surface archaeology in those dunes out there. And in the aerial photograph you could see that Corn Creek is a very interesting feature. There's a wedge that sticks up, a fan. So that looks like it could be a splinter [unclear] fault. So, with the smaller bulldozer I had them trench across that contact and sure enough, day and night difference. One side was moist and the other side was dry and light colored and you could see this. Particularly that one along, I guess it would be, the west side of that thing. The north side of it, there was these erosion remnants where you get some of the[unclear] so those things would be [unclear]. Yep. Because back in those, well it's probably the same way today is

that boy if you start talking about a fault you better have evidence for it. You'll have every geologist in the universe down on it.

(affirmations)

VH: Yep.

2:01:22

KS: That's real interesting. I mean there are several faults there, the geophysics, some recent. Three strands, the Las Vegas Valley shear zone.

VH: Been more work done there? Oh, that's fascinating.

KS: There's at least three strands running through there and the surface expression is at Corn Creek. I mean that is where you can actually see it.

VH: Interesting.

KS: But, um, ya, so, it's really—

VH: Ya, but how 'bout [unclear] scar?

KS: Ya so that's —

VH: What's going on there?

KS: It's sort of orthogonal to that shear zone so there is a pop-up there, pretty significant.

VH: Because you know even in those days some of the wellheads were ten feet above the ground. They found it subsided around it. And just the well heads stick up on it. Ya, that was fascinating.

KS: Right.

VH: Another thing I wanted to do more with was this, with the Las Vegas springs in that area. I never really got to do much with that. But that's a whole interesting relation related to all this hydrologically. And you know there was that spring mound? A couple huge dead spring mounds that were just carbonate mounds.

KS: Uh-huh.

VH: One of 'em on, I can't think of the name of that road, it's on the west side of Las Vegas. Drexel? Dexter?

KS: Raco? Raco? Racal?

VH: Dexter, I think it is.

KS: Oh, Dexter?

VH: Dexter or Dex, something like that. And, so I sampled that, took some pictures of it. You could see, it was completely dead. You could see this little hole at the top where the water was coming out.

Background: Wow.

VH: And one of the other things I realized is that these mounds build up through windblown sand accumulating on vegetation and damp ground. And as they do so, the carbonates are crystallizing, cementing this stuff so you wind up with this mound. If you have water flowing out of it, it could form calcium carbonate layers. Which is what was happening with these things. But if it became completely plugged, sometimes water, if you know, the hydraulic pressure came up again, it would pop up the side. You'd have another spray that happened over in one of the Gilcrease Springs. And of course, Mr. Gilcrease was very cooperative. He let me cut that one mound.

KS: Right.

VH: On Gilcrease Spring. And that was pretty cool because, he cut the mound and here's this black band with two foot faces in the black band. And the mound was [unclear].

KS: Mhmm.

VH: The next morning after they cut that thing, here's this water that had come up. And there's a standing pond in the middle of this thing. Even a little white stood out like a sore thumb cause here's this black mat and here's this white streak of well sorted sand butting right up through it. That's a later spring poked its way up through all that. So, that was a fascinating situation.

(background unintelligible)

VS: Our tape ended, so, barring somebody else coming in could we put another tape in and continue this?

VH: Let me see what the secretary has to say.

02:04:34 - Interview on hold here - discussion by Jeff, VS and K. Turning tape over.

[END OF TAPE 1]

[START TAPE 2]

02:05:11

VH: The other time, when we went to the Tropicana—I cannot remember her name—but she had a big ranch. She and her husband had a big ranch in North Central Nevada. And she was one of the big advisers in the Fleischman Foundation. So, there was a lot of Fleischman money that was

going to some of this archaeological stuff. Well she took Dick and I to dinner at the Tropicana one time. And in one of their private dining rooms, which was a very pleasant experience.

VS: I think we're ready.

JP: Well, I just have one more geology question and then I (unintelligible). So, you know those of us who are working with desert wetlands and things these days. We really consider your work at Tule Springs as kind of the birth of desert wetland research. These deposits were all mapped as lakes prior to this time. So, was there a moment in time, or was there a particular feature where you saw and you started to think, "Wait a minute, there's a little more going on here?" In terms of this wasn't just one big lake. That there was a mosaic of environments and things? What kind of spurred that on?

VH: Well, the situation became more complicated because then I started working with the segmented fans, trying to tie that into things. So that took me on the fan there, coming out of Kyle Canyon.

KS: Mhmm.

VH: And then I noticed there was a spring up there in the fan. So, I got permission from the owner there to uh. This is when Carbon 14 analysis of water was coming into vogue. And Paul Damon was at the forefront of this, he and Austin Long. Austin had taught me how to collect water using that, what was it, was it barium carbonate that we used to?

Background: I'm not sure.

VH: And then we would hydrolyze and date that. So, I started getting some water dates I thought were pretty interesting. When we cut Gilcrease Mound that waterbed, that stuff gave a date of 12,000. And, that spring up in the fan was about the same age. I've forgotten now exactly what it was. So, it was beginning to look like, "ya, this fossil water coming out of this springs." Stuff that recharged some time ago. I had always had problems with this classical model of the water coming down and coming up, you know? And this was clearly showing stuff recharging that was not going way down and coming right up.

KS: And the faults are involved.

VH: Hmm?

KS: The faulting is—

VH: That's another part of the story (laughing).

KS: Ya, ya.

VH: Once I got over into that Tule Springs area you could see there was a lot more going on there. Then, boy I was really scratching my head how tight some of this stuff is in that thing.

KS: Right.

VH: And it had always been drummed into me, you know, spring alignment doesn't mean that there's springs. I mean a fault you know. (laughing). Well it became pretty clear that there's a fault there.

JP: Pretty much.

VH: Ya.

JP: Nice.

KS: Fantastic. Well, I've worked out there a long time and read a lot about the history. It always was interesting and intriguing to me, and you sort of touched on this when you mentioned D. Simpson's name. You did this amazing scientific study, tying in the stratigraphy and the chronology. You essentially came up with the result of the human mega-faunal connection is, probably not there. And that seemed so interesting to me that there's such a large cadre of people, including the reporter who was out there during the, the Big Dig. "What do you mean? (laughter) What do you mean you don't have a connection between the Pleistocene beasties and the people", and I just find that interesting that there's that sort of, kind of, well I'm still going to believe that and there's still a large component of.

VH: Oh ya.

KS: And the archaeologists either kicked their feet in the dust or walked away from Tule Springs. But was there still the grumbling? Or what had happened, or what are your thoughts on (talking over each other).

VH: To Dick's dying day there were a couple of bone things that were tools.

KS: Mhmm.

VH: In fact, he illustrates them. And because they were – they were polished they were spirally fractured and polished. But I, you know one of the things I pointed out was that if they get into the spring conduit—

KS: Right.

VH: —that's exactly what's going to happen to them.

KS: Right.

02:10:11

VH: And it's also about this time that I got to know Hibberd who was this—

KS: Right.

VH: —famous paleontologist from Michigan.

KS: Right, right.

VH: And Hibbard was working on these springs in Kansas and one of his springs was, this was a Pliocene spring you know.

KS: Mhmm.

VH: And it's just identical to what we were finding out here. And there were even some stone fragments in that thing that were polished. And they're not artifacts, they're Pliocene. So, it's a springs, it's very interesting what springs can do to make things look like artifacts. There's one I didn't put it in the report, because I always going to, write a little separate thing about it. Potential pre-Clovis artifacts from the spring conduit of Tule Springs. There is a, it's a part of a camel bone. I've forgotten which end of it is, but it's broken in such a way that it forms a perfect point. And exposed the inside.

KS: Mhmm.

VH: And it's beautifully braided on all sides, so it looks like a tool. But it came out of a 30,000-year-old conduit. So, there's just. You can go through the art assemblages from there and pick out these assemblages that do look like tools.

KS: Ya, definitely. So how often did you go back after, the time that everybody was there to finish up your dissertation.

VH: I went back several times just because I was still trying to answer some questions you know.

KS: Ya.

VH: And when that SSA meeting was there I hadn't gone back in a long time. What I'd been doing, I'd been taking repeat photos of Brooks' site there because there's a little greasewood there. You know it was about so big when we started.

KS: Uh huh, uh huh.

VH: And next thing you know it's about this big. (Gestures with large circle over his head).

KS: Right.

VH: You know.

KS: Right.

VH: You know.

KS: I'm good, if you need to [unclear].

VS: So you did a wonderful job because my 14 questions got answered without me asking.

(laughter)

Background: I'd say about 20% of my questions were answered so I didn't have to ask them either. We have one answer from Erin.

EE: You kind of answered it before a little bit about you'd have briefings during the weekends for the Advisory Committee and how you discussed with the crew [in] the evenings. I was just wondering 'How often did you refer to other scientists' data to confirm your own findings?' Did, what they were finding ever change your mind about what you were finding?

VH: Well, you know when I went out there I was sort of convinced that we were, the way they had written up it had become obvious they had fire hearths. They had these artifacts, the one artifact in particular was found in Stratum D I think, and that was pretty convincing. And you know Phil Orr thought that the evidence was good and Dee did and of course Harrington and of course Charlie, Charlie was there. So, one of the things that I did was Dee showed me where she had found that tool, and it was on their map. But she showed me specifically where it was. So I put in a hand excavated, an excavation there.

And it was, as I looked at the walls of this thing, here is Stratum D, which is this green stuff. But, here is this, same stuff but it's loose and it's slump wash. And in it was that scraper and that scraper had desert varnish on it. That desert varnish forms up here (raises hands) on the surface so what had happened is that had gotten washed off the surface and gotten into this thing and then the slope wash had buried it. So, when Dee spotted it, to her, it was in D. And when I pointed this out to her, and showed it to her, she sort of said ya, hmm. But she never ever backed up on that stuff being Paleo-Indian stuff. Ya.

EE: So, just one more quick question. So how did you consolidate the, how you cross referenced each other as far as that situation goes. Did you have official briefings besides the informal ones you had or how did you—

VH: In the evenings we'd chew the fat there in the mess hall and discuss this sort of stuff. And if there was any particular question or anything we might all gather in that spot and talk about it.

KS: Oh fabulous.

VH: Ya. That was pretty frequently where Brooks was digging in that spring that was cut there.

VS: I just have a couple of wrap-up questions here. Anybody else have anything before we close out? OK. So, I noticed a couple of times when you mentioned Trench K you sort of giggle. And, you can tell us about Trench K and what you find humorous about it?

VH: Well, it was where we put the bulldozers when we wanted to give them something to do, while we looked more closely at something they had found. And so, I told Dick you know, just go off, out of the site, so we are not going to expose any more archaeology 'we hope;. Put these bulldozers in there to keep them busy. I had in the back of my head that if this went on long enough we might get clear across, because I'd love to tie the fan into what we were doing in the valley. And as the expedition went on we did that you know. And that one picture showing the Research Committee, that's Trench K and you can see it is not only wide, but it's 40 feet deep in one place. And there's a strat gravel on top which is and I don't think anyone in there is wearing hard hats.

(laughter)

VS: Do you know the length of that trench?

VH: I think it is written in here.

VS: So that needs to be nominated to get us a world record for the largest archaeological excavation in the world.

VH: It's like 3,500 feet or something like that.

VS: So, I would be remiss if I didn't ask you the question because of your association with Paul Martin. What are your thoughts about Pleistocene extinction overkill?

VH: Well, I've never been satisfied that anything works. I worked on a lot of sites and there's one thing that strikes me, is that something happened about 12,000 radio-carbon years ago. But I see evidence for stratigraphic change and loss of the fauna at about that time. In so many places. That's when the catastrophers came up with this cosmic catastrophe business, I had first thought, "Well they may have something here." And that's why I took them out to Murray Springs to sample that. But that hasn't held up. But there's, the amount of people in this country at Clovis time has got to be pretty small. By you know, it's one of these things that just went exponential. So, at this early stage, this pretty small and as far as them wiping everything out on the continent, I find that hard to see. There's no doubt in mind that they had an effect. There's just no question. You take Langer where's there, now there's nothing -Chip Saunders.

We went back and reopened later in '74-75 and found three more mammoths. So there's like 14 or 15 mammoths there and there's 13 Clovis points. Eight or so other artifacts and some debris flakes. So I'm not convinced that's evidence they killed all those mammoths. I think some of those mammoths are natural deaths. Now the one that Haury shows with two of the points in the rib cage, there's no doubt about that in my mind. Human predators took that guy down. You go to the Langer Site, I mean to the Naco's Site and you have a mammoth that had five Clovis points in the chest cavity, plus three others within the site area. You look at all the Clovis Sites that have been found. You never find more than two Clovis points with a mammoth carcass. With a skeleton. There's five in that. Probably eight. So, I think that's one that got away. I don't think they would have left those points on, beautiful, gorgeous things. I don't think they would have left those in there. So, I think that one got away. But over the years as we've looked at all of these extinct model locales in the San Pedro Valley. It turns out now there are more mammoth localities without artifacts right under that black mat (02:20:15) then there are that do have artifacts. And there are three, three or four of them, are nice, young tender things. They're small mammoths. They have little jaws about that big, you know. What killed them? Really, it's a real puzzle.

(affirmation)

VH: But you know it's the cosmic catastrophe is another case where they wanted to believe what they wanted to believe. It just doesn't matter. And, it, they, they just, they put papers in that [unclear].

Background: Over and over

VH: Ya, (laughing)

VS: Have you been involved in any other research projects that occurred within National Park Service areas that you recall?

VH: Oh gosh, I visited, but that's BLM up in Alaska to visit that. And I probably have but I can't put my finger on it right now.

VS: You visited Rampart Cave. Can you tell us about that experience?

VH: That was a field trip that Paul organized with the [unclear] and various students. I forgotten the name of the parks, the Ranger that had come meet us. This was I'm trying to think if this was before the fire. I think it was probably after the fire. We hiked in there to the caves, spent the night and poked around. And much of the discussion being about extinction and climate change and so forth. That was my first experience with marijuana (laughing). Highly overrated.

(Laughter from background).

VS: Ok. How would you like Tule Springs to be remembered in the future?

VH: Well, it just is something that could be done with the proper support. The proper financial support, with the proper personnel. I mean we need to have more things like this. Things like, one of the things that I gripe about, a lot of archaeologists that I work with and of course their teaching and they're in college. We'll spend so many weeks at this site and, then so many weeks at another site. This is in the summer because they're training people.

But certain sites where you know you could get the answer to some really important answers you just stick with it, you just go to these other things. A classic example is Hell Gap. Hell Gap is one of the most incredible sites in this country because it has multiple Paleo-Indian occupation levels. We've never found Clovis there. We've found little Sharpis. Well the Hell Gap site covers, uh, you know it's, it's along a creek that revolves around like a [unclear] called by a fall. And so there's four areas that have these multiple layers. Right on down to this layer where if Clovis was there, that's where it would be. Well, those three or four localities are separated by 100s of feet, or meters of stuff that hasn't been tested yet. So the day is going to come when I think they are going to find fulsum stuff there. I mean Clovis stuff there. Because it's a, it was, it's been a, the reason why people like that in the past so much is that first of all, it's hard to fill up with, so you get up on top there and you can see Signal Butte in Alaska. I mean [unclear] or the other side. So you can see any game that's out there for miles away. At this creek, spring-fed creek, so it's active, it's fluctuated. Climate, climatologically, but it's been active most which.

See another question I have is, "Why has this surface that I'd call a Clovis surface, a surface there? Was the water table down at that point?" It's been stripped in places and I see that same situation at other places. So, there's a lot to learn there. Why go off and look at other sites? Just stick with that, and of course, George Frisson feels the same way. He's 90 something you know. And I also think at Hell Gap, at the base, you know, that, so here's you have these

[unclear] sediments with the limestone top and quartzite's and all this. And it's huge, [unclear], you know, with lichen covered [unclear] about so big you know.

Where did they kill these bison? I bet they're running to this. I bet they were running on the top of that thing. But then how do you excavate that? Well, you get some money and pull rock by rock, one by one until you get down and see what's under all that stuff. I bet there's there are kill sites. Don't know that, but.

KS: Is that an analogy for Tule Springs? Do you think that people keep looking they'll find some connection that—

VH: Well, let's put it this way. You'll want to look where there's game, potential game fauna. That's still a viable option. Ya.

VS: So the Park Service and John [Leffet?] and his team are embarking on developing a Visitor's Center how to best interpret the history of Tule Springs. And obviously you are part of that history, as well as Jeff and Kathleen. So, is there anything that you would like to see the NPS include in their interpretation of the Tule Spring Expedition that you were involved in for a future Visitor's Center?

VH: Well, you know I could, it's like Murray's place. What I'd like to see there is an interpretive center. Uh, you know there's a little bench there. It's the high service then there's the little bench, then there's the Clovis camp site. That little step there would be an ideal place to have an interpretive center overlooking this site. You could have the same thing at Tule Springs where you have dioramas in the interpretive center and showing the change of time and of course that, picture that Maternis did (shuffling papers). See Geographic was a part of this. And so, he did this really neat piece of art about killing a camel [unclear]. Well of course they never used it because we could never prove that they did that. But, it's stuff like that, can be because you take anybody goes out there now. What the hell am I supposed to see out here you know? Unless you take them to a fossil they could dig up there you know. It's not going to mean anything to them.

VS: So, is there anything that we haven't discussed that you feel is worth sharing with us?

VH: Park Service. I did work with the Park Service.

VS: Excellent.

VH: Custer Battlefield National Monument.

VS: Oh, you're kidding? What did you do there?

VH: Well, we were trying to find out, you know, Deep Ravine is where there is supposed to be Troop E. There's a whole bunch of members of Troop E that are not accounted for. And, there are eyewitness accounts, that Indian accounts that these guys had gotten into this [unclear]. In other words it was a ravine but it had uh, it was a blind canyon. And it's just down from Custer Monument. Custer [unclear] and three days later when they are removing these bodies you read these stories they were so putrefied that they couldn't; they would grab an arm and all the skin would come off the bones. It was just they were having a terrible time so they just broke the

sides of the arroyo down. [unclear]. We could never find that. And, now a days I'm sure they wouldn't let me do it but I would put in eight backhoe trenches across.

(background laughter)

VH: And so, I worked out the chronology of Deep Ravine and said, "Here's the surface that this stuff has got to be on." Because if you've got carbon dates and this thing you know. And unfortunately in the book that Doug Scott and others did on that, with my part in it, in the stratigraphic table, that one unit is somehow it got missed, and I never got to review that book. The key stratum is missing in the [unclear].

Background, maybe Kathleen: Oh dear.

VH: So, that's one of my, my things on my backlog list is to make, straighten that out, you know. Then they had me out there again, when they were doing the area near the Reno canteen, part, where they talked about abandoning some of their equipment and burning it. So the Indians wouldn't get it. So Doug and Rich Fox and Dick Harmon and the NPS excavated that so they had me (02:30: 32) up there to work on that stratigraphy.

In the meantime, I was already working with some of the landowners to work out the chronology of the Little Big Horn River. So I got dates in those terraces, I haven't put that together yet. But, by dating those terraces, you can work out the age of those surfaces. Figure out what it was like back when the battle took place and whether there might be. You know they have found human remains coming out of the bank in the river there that were related, that were battel related.

VS: Ya, and the big fire in there that exposed.

VH: That's what got the whole business started in the first place. You know, Rich Fox who was an archaeological student at that time he's from Hardin and so he was very familiar with the battlefield. After that fire he went out there and immediately saw these cartridges shells exposed on the surface. So, he told the supervisor, oh what's his name? He's retired there now, and he's the one that's—

VS: Gerard Baker?

VH: No. It's before him. He's the one who heads up this Battlefield Preservation Society. Where we've contributed money to through the years. He was the Supervisor then and he immediately agreed with Rich and they got Doug Scott and they got Park Service permission to do that fabulous metal detecting archaeological sur-systematic- survey. I had been working on the 1873 Yellowstone Battlefield which is, I call it the Custer Battle that fell through the cracks. Because, most people don't even know about it.

You know, he was protecting the surveyors of the Northern Pacific Railroad. And in '72 they didn't have cavalry, they had infantry. It's hard to chase mounted Indians if you're a foot soldier. So, they finally had the seventh [unclear] in '73. And they, Bloody Knife who was Custer's scout told him, "You know we're being watched every day." You can't see it, but we see it, you know. And finally on the 4th of August they got ambushed. Custer would go ahead each

day, getting away from the main column to what they call "pioneer". To cut down the arroyo banks that they might have to go through and to find a campsite.

So, he was always way ahead of main command by the time they found a nice campsite and he found this nice campsite in a cotton wood grove near what is today Mile City and they got attacked. And they spent the whole day defending themselves. And it turns out what they were in was an abandoned meander. The cottonwoods in there became where they turned the horses loose, while the rest of them sacked out. And one of the Pickets came in and woke Custer up and said, that you know, there are some Indians, it means they want to talk, you know. So, Custer got his brother to put out a skirmish line and he went out and talked to 'em. With Bloody Knife and his other orderly and the Indians moved a little farther away. And he could see another cottonwood grove and sure enough 300 of them come out of that cottonwood grove and he barely got back to the skirmish line his brother had put out you know.

So, that battlefield, they started following the main village because all of the Indian scouts were saying, “We're following a huge village.” So, General Stanley let Custer take the entire 7th. So on the 11th, he caught up to where they had just crossed the Yellowstone River. Spent the whole day of the 10th trying to cross that river and they couldn't do it. And that evening, they made camp and some Indians came down to water their horses on the other side and noticed what was going on and started to talk with Bloody Knife and the other scouts. And, so they're saying, “Cross the river tomorrow it's going to be another Feteran massacre “ you know. So, they knew they had been seen, they hadn't gotten across the river.

So, what Custer did was put his camp, he moved off this island they were on and put his camp on the floodplain, but the pickets out that, in the wee hours of the morning they came in, they woke him up and said, “They're crossing the river before us, above us and below us.” Custer said, “Great, we don't have to cross the river, they're coming to us.” And, so there was all, there was a day long fight in which Lt. Bradyn was seriously wounded. His pelvis was shot and it went on all day ‘til the main command came up and they didn't chase the, we could never find cartridges to the downstream. And I think that's because the river has cut in there so much. I think, he specifically states that Lt. French is to keep him away from downstream and the rest of the troops are keeping him from chasing. He said, we chased them upstream about nine miles, just cut that in half we found the last cartridges 4 1/2 miles (laughing). But that's never been written up, so that's more of my backlog, I got to at—

JP: You better get to work Vance.

(background laughter).

VS: Ya, we shouldn’t hold you any longer then. Just a couple questions. I just wanted to ask this on behalf of Henry. Hypothetically, if somebody working for the Las Vegas Review Journal in 1962 was talking to one of Las Vegas bookies, what do you think the odds they were given that the expedition finding human and faunal associations?

VH: I think they would of been very positive in that respect. Ya.

VS: We've had a lot of fun since the monument's been established and it's amazing the public interest in Tule Springs by some friends groups, the general public, by the political leadership,

bi-partisan support for Tule Springs. And it really is a national treasure and we're very indebted for both your work and the work that Kathleen and Jeff continue to do that's remarkable at Tule Springs. Things that we have done is that we've engaged the public by keeping things secret and then all of a sudden announcing to the public news. So, I think what Henry is going to do is he's going to take this story back and, and put it into the newspaper and I think the folks are going to be very interested in hearing this part of the story. By somebody who can speak from a firsthand account on things that they're very interested in. So, in the secret of secrets, in the spirit of secrets, the concept of what happens in Vegas, stays in Vegas. Are there any secrets from 1962 or 1963 you haven't told us yet? (laughter)

VH: Well, we have always been curious about the archeology that came out of that Holstein channel. There's a caliche B that you know, it's one of those things that has a hole through it. You know. So, is it a piece of natural caliche, that they picked up and modified? It's been so long since I, when I saw that thing at the time I just didn't, I didn't think it was an artifact but I think it, with today's expertise it should be looked at more closely.

There's also a highly polished piece of bone that was thought to be an awl. And, that may or may not be. But, absolutely unequivocal artifacts are coming out of, came out that channel. When we put, no, once we got onto that, that's the channel where they found the obsidian flake early on and so we put a bunch of trenches and, put, this was toward the end of the expedition. So we just put crews into each one of those things and excavated. And there was one scraper I think, a couple of lithics that are unquestionably artifacts. But they're in stratum that is less than 12,000 years old, but more than 10,000 years old. That's all you can say about it. By the way the other thing I think you must do at this site is excavate one of those bone beds and have it as a display. I mean, find one of these places where you've got some good bones in place and make it a display. There's nothing like seeing the actual stuff, you know.

VS: So the obsidian flake you are referencing is the Fenley hunter specimen?

VH: Yes.

2:40:00

VS: Ok, so, that was what I was going to end in is, that, based on everything you understand and learned, what is the oldest date that you feel confident in saying there was human evidence at Tule Springs?

VH: It would be somewhere between 10 and 11,000 radiocarbon years ago. That flake is in that channel, but they, we came to the conclusion that they were not found where the camel was found. So, there's probably stratigraphically above it. We just don't know that for sure. I said somebody ought to do a, as iffy as it is, an obsidian hydration ought to be done on that flake. That would be interesting to see and then look through our collections and see any other obsidian from archeological sites in that region that you could compare the hydration [unclear]. Hydration is a real iffy situation. There are so many variables involved that you know, you might be able to get some relative ages, but not specific ages.

VS: I know Johnathon and others would love it, if at some point you wanted to visit Tule Springs. They would absolutely give you the VIP tour.

VH: What are the plans for Tule Springs?

VS: I'm sorry?

VH: What are the plans for Tule Springs?

VS: So, several little phrases that I use too often, things like, "The planning will take us where we need to go", because the legislation had a very specific public planning process included in it, including an Advisory Council. In fact, we're getting ready to have our first Advisory Council meeting and start kicking off our management plan. So, much of the decisions like of where any facilities will go, like that, are future decisions so what we are doing now is to engage kids. So with the Protectors of Tule Springs kicked off, we've got lesson plans for every grade from kindergarten through high school. And, we did a penny push, the Mammoth Penny Push, over the last two weeks which actually brought in $50,000 dollars to the Protectors of Tule Springs. But more importantly, every school child in Clark County, the 5th largest school district in the country, received a two-sided flyer about what Tule Springs is. What its history is, why it's special and why we should preserve it. They all took those home and then we had a Girl Scout Troop that scripted a video for us. We worked with PBS and the Girl Scouts. And PBS storyboarded it and we ended up with this very nice 10-minute video about Tule Springs. As of last Friday, 327,000 school kids had been exposed to it. Which is great, because those dirt bikers you were talking about, they're still out there. Lesser extent now.

But it's really, it's going to take educating this generation now to really affect the future. So, a lot of those things we are doing now. We're getting ready this year, we'll put out three kiosks on the site. One will focus on the Tule Springs project and talk about the important rule. One will focus on the geology of the area, and one, of course, will be charismatic mega-fauna because that's what, you know, the public is most interested. Then we'll turn that around to talk about the true importance of the site. So it's a really active time, but it's also a really good time for us to look back and make sure we're capturing that spirit that you guys brought to the site. Thank you so much for today.

VH: Oh, glad to do it. You know last time that I was out there, there was that uh, remote control flying.

VS: Yes.

VH: Going on.

VS: Yes. And that's still just slightly out of the park, BLM held on to that little stretch of it. Between those little things, those little things and the Air Force drones, I get some very interesting overhead flights right now.

(Laughter)

VS: I've been thinking that we really need to get Air Force to help us with our mapping. Because they are flying over me.

VH: You know find out who the Air Force archaeologist is.

VS: Yep.

VH: Because I don't know who it is now, but, who used to be there, he used to send me their annual reports.

VS: Ya.

VH: The money he was getting was mind-boggling.

VS: DoD [Department of Defense] resources has an amazing amount of funding.

VH: Ya. (Laughter)

VS: Well if I could get you to just fill this out, giving us permission to utilize the information that we have, I've got a pen here if you want or you're on there. I think.

02:45:08

[END OF TAPE 2]

[END OF INTERVIEW]