An Interview with

GARRY HOLLIS

An Oral History produced by
Robert D. McCracken

Yucca Mountain Series

Nye County Town History Project
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CONTENTS

PREFACE

The Nye County Town History Project (NCTHP) engages in interviewing people who can provide firsthand descriptions of the individuals, events, and places that give history its substance. The products of this research are the recordings of the interviews and their transcriptions.

In themselves, oral history interviews are *not* history. However, they often contain valuable primary source material, as useful in the process of historiography as the written sources to which historians have customarily turned. Verifying the accuracy of all of the statements made in the course of an interview would require more time and money than the NCTHP's operating budget permits. The program can vouch that the statements were made, but it cannot attest that they are free of error. Accordingly, oral histories should be read with the same prudence that the reader exercises when consulting government records, newspaper accounts, diaries, and other sources of historical information.

It is the policy of the NCTHP to produce transcripts that are as close to verbatim as possible, but some alteration of the text is generally both unavoidable and desirable. When human speech is captured in print the result can be a morass of tangled syntax, false starts, and incomplete sentences, sometimes verging on incoherence. The type font contains no symbols for the physical gestures and the diverse vocal modulations that are integral parts of communication through speech. Experience shows that totally verbatim transcripts are often largely unreadable and therefore a waste of the resources expended in their production. While keeping alterations to a minimum the NCTHP will, in preparing a text:

a. generally delete false starts, redundancies and the *uhs*, *ahs* and other noises with which speech is often sprinkled;

b. occasionally compress language that would be confusing to the reader in unaltered form;

c. rarely shift a portion of a transcript to place it in its proper context;

d. enclose in [brackets] explanatory information or words that were not uttered but have been added to render the text intelligible; and

e. make every effort to correctly spell the names of all individuals and places, recognizing that an occasional word may be misspelled because no authoritative source on its correct spelling was found.

ACKNOWLEDGMENTS

As project director, I would like to express my deep appreciation to those who participated in the Nye County Town History Project (NCTHP). It was an honor and a privilege to have the opportunity to obtain oral histories from so many wonderful individuals. I was welcomed into many homes—in many cases as a stranger—and was allowed to share in the recollection of local history. In a number of cases I had the opportunity to interview Nye County residents whom I have long known and admired; these experiences were especially gratifying. I thank the residents throughout Nye County and Nevada—too numerous to mention by name—who provided assistance, information, and photographs. They helped make the successful completion of this project possible.

Appreciation goes to Chairman Joe S. Garcia, Jr., Robert N. "Bobby" Revert, and Patricia S. Mankins, the Nye County commissioners who initiated this project in 1987. Subsequently, Commissioners Richard L. Carver, Dave Hannigan, and Barbara J. Raper provided support. In this current round of interviews, Nye County Commissioners Butch Borasky, Lorinda A. Wichman, Joni Eastley, Gary Hollis, Fely Quitevis, and Dan Schinhofen provided unyielding support. Stephen T. Bradhurst, Jr., planning consultant for Nye County, gave enthusiastic support and advocacy of the program within Nye County in its first years. More recently, Darrell Lacy, Director, Nye County Nuclear Waste Repository Project Office, gave his strong support. The United States Department of Energy, through Mr. Lacy's office, provided funds for subsequent rounds of interviews. Thanks are extended to Commissioners Eastley and Hollis and to Mr. Lacy for their input regarding the conduct of this research and for serving as a sounding board when methodological problems were worked out. These interviews would never have become a reality without the enthusiastic support of the Nye County commissioners and Mr. Lacy.

Jean Charney served as editor and administrative assistant throughout the project; her services have been indispensable. Valerie Brown, Jean Charney, Robert B. Clark, Anna Lee Halsig, Debra Ann MacEachen, Lynn E. Riedesel, and Marcella Wilkinson transcribed a number of interviews, as did the staff of Pioneer Transcription Services in Penn Valley, California. Julie Lancaster and Suzy McCoy provided project coordination. Proofreading, editing, and indexing were provided at various times by Marilyn Anderson, Joni Eastley, Michael Haldeman, Julie Lancaster, Teri Jurgens Lefever, and Darlene Morse. Joni Eastley proofed most the manuscripts and often double-checked, as accurately as possible, the spelling of people's names and the names of their children and other relatives. Jeanne Sharp Howerton provided digital services and consultation. Much-deserved thanks are extended to all these persons.

All material for the NCTHP was prepared with the support of the Nye County Nuclear Waste Repository Office, funded by the U.S. Department of Energy. However, any opinions, findings, conclusions, or recommendations expressed herein are those of the author and the interviewees and do not necessarily reflect the views of Nye County or the U.S. DOE.

—Robert D. McCracken
2013

INTRODUCTION

Historians generally consider the year 1890 as the close of the American frontier. By then, most of the western United States had been settled, ranches and farms developed, communities established, and roads and railroads constructed. The mining boomtowns, based on the lure of overnight riches from newly discovered mineral deposits, were but a memory.

Nevada was granted statehood in 1864. But examination of any map of the state from the late 1800s shows that, although most of the state had been mapped and its geographical features named, a vast region—stretching from Belmont south to the Las Vegas meadows, comprising most of Nye County—remained largely unsettled and unmapped. In 1890, most of southcentral Nevada remained very much a frontier, and it continued to be so for at least another twenty years.

The spectacular mining booms at Tonopah (1900), Goldfield (1902), Rhyolite (1904), Manhattan (1905), and Round Mountain (1906) represent the last major flowering of what might be called the Old West in the United States. Consequently, southcentral Nevada, notably Nye County, remains close to the American frontier; closer, perhaps, than any other region of the American West. In a real sense, a significant part of the frontier can still be found in southcentral Nevada. It exists in the attitudes, values, lifestyles, and memories of area residents. The frontier-like character of the area also is visible in the relatively undisturbed quality of the natural environment.

Aware of Nye County's close ties to our nation's frontier past, and recognizing that few written sources on local history are available, especially after about 1920, the Nye County Commissioners initiated the Nye County Town History Project (NCTHP) in 1987. The NCTHP represents an effort to systematically collect and preserve information

on the history of Nye County. The centerpiece of the NCTHP is a large set of interviews conducted with individuals who had knowledge of local history. Each interview was recorded, transcribed, and then edited lightly to preserve the language and speech patterns of those interviewed. All oral history interviews have been printed on acid-free paper and bound and archived in Nye County libraries, Special Collections in the Lied Library at the University of Nevada at Las Vegas, and at other archival sites located throughout Nevada. The interviews vary in length and detail, but together they form a never-before-available composite picture of each community's life and development. The collection of interviews for each community can be compared to a bouquet: Each flower in the bouquet is unique—some are large, others are small—yet each adds to the total image. In sum, the interviews provide a composite view of community and county history, revealing the flow of life and events for a part of Nevada that has heretofore been largely neglected by historians.

Collection of the oral histories has been accompanied by the assembling of a set of photographs depicting each community's history. These pictures have been obtained from participants in the oral history interviews and other present and past Nye County residents. In all, more than 700 photos have been collected and carefully identified. Complete sets of the photographs have been archived along with the oral histories.

On the basis of the oral histories as well as existing written sources, histories have been prepared for the major communities in Nye County. These histories have been published by Nye County Press, the county's publishing department. All the oral histories, as well as the community histories, are available on the Internet.

The Nye County Board of County Commissioners, while motivated by the study of history for history's sake, initiated the NCTHP in 1987 principally to collect

information on the origin, history, traditions and quality of life of Nye County communities that would be impacted should the nation's first high-level nuclear waste repository be constructed deep inside Yucca Mountain on federal land in southcentral Nye County. Understanding such impacts would aid in their mitigation. Moreover, if the repository were built, it would remain a source of public interest for a very long time and future generations would likely want to know more about the people who once resided in the area. If the site should be found unsuitable and the repository never constructed, then materials compiled by the NCTHP would nevertheless be available for the use and enjoyment of future generations.

In 2010 the Nye County Commissioners and Darrell Lacy, Director, Nye County Nuclear Waste Repository Office, approved funding for collection of a round of oral histories from individuals who had played important roles in the U.S. Department of Energy's effort to assess the suitability of Yucca Mountain as a site for permanent storage of the nation's high-level nuclear waste. (The term high-level nuclear "waste" is very much a misnomer. The vast majority of the energy originally present in the nuclear fuel remains when the spent fuel—i.e., waste—is removed from the reactor. The spent fuel needs only to be reprocessed in order to make the remaining energy available for reuse. The proper term is thus not nuclear waste, but "spent nuclear fuel.")

The search for a permanent storage site for spent nuclear fuel was authorized by the Nuclear Waste Policy Act passed by Congress in 1982, as amended in 1987. Initially, several potential sites for construction of a permanent repository were considered; the 1987 legislation narrowed the suitability search to one site, Yucca Mountain.

Over the years, several thousand scientists and engineers participated in the study of Yucca Mountain's suitability for permanent storage of spent nuclear fuel, with several

billion dollars expended on the effort. In all that research, nothing was found that would disqualify Yucca Mountain as a safe permanent storage site. Then, in 2008, in a step prescribed by the 1982 and 1987 legislation and based on the research findings, the U.S. Department of Energy applied to the Nuclear Regulatory Commission (NRC) for authorization to begin construction and move forward with development of a permanent repository at Yucca Mountain. The NRC was then required by law to evaluate the DOE's application and vote up or down on it—build it or forget it. That was and remains the law!

Beginning in 1983, the issue of possible construction of a permanent repository at Yucca Mountain gradually became controversial among many in Nevada. A number of high-profile politicians expressed strong opposition to the idea of storing spent fuel at Yucca Mountain from the beginning, regardless of the site's technical suitability. Several increased their political power through their outspoken opposition, essentially doing everything legally possible to block the effort. Public opinion in Las Vegas about Yucca Mountain, which was rather mild and mixed in the beginning, gradually became somewhat negative over the years, especially after 1987, when Yucca Mountain was singled out as the only candidate. Yet at the same time, public opinion in rural Nevada began and remained accepting of the program, especially in counties located closer to Yucca Mountain itself.

Nevada Congressman Harry Reid rode his strong outspoken opposition to Yucca Mountain to election to three terms in the U.S. Senate. In January 2007, he was chosen Senate Majority Leader by the majority Democrats. Newly elected President Barak Obama was highly dependent on Senator Reid for passage of his own legislative agenda. In order to mollify Senator Reid, all funding for any further work on Yucca Mountain

was killed and the Nuclear Regulatory Commission (NRC), under Chairman Gregory Jaczko's maneuvering, was prevented from voting up or down on the Department of Energy's application to move forward with development of the repository. Many believe that a vote by the NRC was prevented because approval by the NRC staff was likely. Thus, one man—in this case, Senator Reid—in effect played a pivotal role in overriding the legal process prescribed by law. The findings of more than two decades of carefully conducted research costing several billion dollars were casually set aside.

In the meantime, spent nuclear fuel continues to accumulate at temporary storage facilities located near nuclear reactors at more than 45 locations around the country, some near very large cities, including Chicago.

About the Yucca Mountain Interviews

Dr. Michael Voegele held numerous positions with DOE contractors in assessing Yucca Mountain's suitability for permanent storage of spent nuclear fuel from 1981 to 2009, and continued after that as a consultant to Nye County. Perhaps more than anyone, he has a comprehensive view of the more than three decades of research about the safety of Yucca Mountain. He personally knew many of the scientists and engineers involved in the effort, including what their work consisted of and how it all came together. Given such expertise, he played a key role in selecting the majority of individuals we interviewed on Yucca Mountain history. Dr. Voegele assisted in many of the interviews and was also interviewed by me at length. Together, these interviews provide a boots-on-the-ground perspective of the assessment process in evaluating Yucca Mountain's suitability as a permanent repository site. Individuals interviewed were Drs. Thomas Cotton, Russ Dyer, Ned Elkins, Don Vieth, Jean Younker, and Michael Voegele.

Two Nye County officials who played significant roles in the Yucca Mountain effort for Nye County over the years were interviewed. Steve Bradhurst was the first director of the county's nuclear waste office, serving from 1983 through 1993. He was interviewed twice, in 1991 and again in 2010. Gary Hollis served as a Nye County Commissioner from 2005 to 2012 and in effect functioned as the commission's point man on the Yucca Mountain project during his time in office. He also was employed on drilling efforts associated with the assessment at Yucca Mountain prior to being elected a commissioner.

As noted, the idea of permanently storing spent nuclear fuel at Yucca Mountain became a heated political topic in Nevada beginning in 1983. To be fair and to give as broad a perspective as possible, we also conducted oral histories with politically focused individuals who represented differing viewpoints on Yucca Mountain. Former Nevada U.S. Senator Chic Hecht was a strong supporter of Yucca Mountain from the outset; he was interviewed in 2004. Former Nevada Governor, subsequently U.S. Senator, Richard Bryan, a strong and vigorous opponent of Yucca Mountain from the beginning, was also interviewed. At the conclusion of that interview in 2011, although by then I was a strong proponent of Yucca Mountain, Senator Bryan told me I "had been very fair." As a professional anthropologist, I take a lot of pride in his compliment. Bob Loux from almost the outset of the Yucca Mountain effort in 1983 functioned as the state of Nevada's anti-Yucca Mountain point man in his position as director of the state of Nevada Agency for Nuclear Projects. His job, as he acknowledged in his oral history, was to do anything legally possible to prevent a Yucca Mountain repository from ever becoming a reality. As with Senator Bryan, the interview with Mr. Loux went well.

Unfortunately, U.S. Senator Harry Reid, despite repeated requests, did not make himself available for an interview.

Three additional interviews were conducted outside this Yucca Mountain interviewing effort, though still using Yucca Mountain funds. These individuals played important roles in the Yucca Mountain assessment effort. Troy Wade previously worked for the Department of Energy; he was Assistant Secretary of Energy for Defense Programs in 1987–1988. He was interviewed as part of the NCTHP. Carl Gertz was Yucca Mountain Director from 1987 to 1993 and earlier worked for the DOE at the Idaho National Engineering Laboratory. Ed Mueller worked for a U.S. Department of Energy contractor as a liaison between the Yucca Mountain project office and counties impacted by Yucca Mountain located in Nevada and California. Both Mr. Gertz and Mr. Mueller were interviewed under the Esmeralda County History Project.

Together, these interviews comprise a body of valuable information obtained from individuals representing a variety of perspectives on this important effort in our nation's energy history. A credible history of Yucca Mountain cannot be written without incorporation of such variable knowledge and perspectives. If development of a permanent repository at Yucca Mountain moves forward, such information on how the site was evaluated and on the enormous amount of work involved in demonstrating its suitability will prove invaluable once construction begins. The same applies for selection of a second or third repository site, and for the efforts of other nations to construct repositories as well. If the Yucca Mountain effort never moves forward, these interviews still will be helpful in understanding the great effort that went into the evaluation of Yucca Mountain as a site for permanent storage of spent nuclear fuel. It unfortunately

also tells how a good part of the more than $11 billion spent in evaluation was in large measure wasted, not for technical faults, but for political expediency.

Opinions expressed in this introduction and in the oral history interviews do not necessarily reflect the views of Nye or Esmeralda County officials.

These interviews have been organized into four volumes and published by Nye County Press, publishing imprint owned by Nye County, Nevada. A master index covering all four volumes is included.

—RDM
2013

INTRODUCTION BY MICHAEL VOEGELE

This series of interviews with Dr. Robert McCracken, undertaken as a part of the Nye County Town History Project, focused on the Yucca Mountain project. The Yucca Mountain project oral histories were developed as part of Nye County's efforts to record information related to the project as an ancillary part of the Yucca Mountain history exhibits in the Pahrump Valley Museum. The Nye County Commissioners believed that it was important to capture this historical information, as the Department of Energy had made every effort to disassemble the project and its records when the Obama Administration made the decision that the project was unworkable, and created the Blue Ribbon Commission on America's Nuclear Future to undertake a comprehensive review of policies for managing the back end of the nuclear fuel cycle, including all alternatives for the storage, processing, and disposal of civilian and defense used nuclear fuel and nuclear waste.

I worked with Dr. McCracken on the selection of the interviewees, and on several occasions participated as an interviewer. We consciously tried to identify interviewees who had been involved at the heart of the technical story of Yucca Mountain. Because funds were not unlimited, we needed to select carefully a relatively small number of interviewees. There were potential interviewees that we were not able to talk to because they had moved on to other venues following the Department of Energy's termination efforts and we simply were not able to accommodate schedule problems. We also tried to ensure a balance of perspectives on the project. Readers will find that the interviews tend to focus on a portion of the project's history or a major technical element of the project. In recognition of this, we decided that there ought to be an interview that attempted to

encompass as much of the project's history as possible, bearing in mind that the relevant history covers nearly 70 years.

The interview Dr. McCracken conducted with me is that document. While my tenure on the program was longer than most, I certainly do not have firsthand knowledge of the earlier parts of the program. I have, however, long studied the origins and early history of the project. My time on the high-level waste disposal program dates from the mid-1970s to the present, and I did not necessarily have significant involvement in everything talked about in that document. I am particularly indebted to Dr. Donald Vieth for the many discussions we had on the earlier parts of the program and found it fascinating how together we helped each other remember so much of the program's early history.

I felt it was important to offer the caveat that it would not surprise me to find that a reader remembered things differently than I did, or believed that I was mistaken in my recollections. I accept responsibility for any such errors; I can only say it has been a long time. It is also important to acknowledge the time so graciously accorded us by the interviewees. I suspect that some of them wish, as I do, that there had been references available to check some of our memories. I can only say thank you for trying to help us collect some important information.

I'd like to particularly thank Nye County Commissioners Gary Hollis and Joni Eastley for their enthusiastic and unwavering support for the interview project and the museum displays, and Dr. McCracken for his skill as an interviewer.

Michael D. Voegele
2013

Interview by Robert McCracken, talking to Gary Hollis, Nye County Commissioner, at his home in Pahrump, Nevada, August 14 and 15, and September 4, 2010. Geneva Hollis joins the conversation from time to time.

CHAPTER ONE

RM: Gary, why don't we start with you telling me your name as it reads on your birth certificate and when and where were you born?

GH: Charles Gary Hollis. I was born August 8, 1947, in Florence, Alabama.

RM: And what is or was your father's name?

GH: His name was Charles Kermet Hollis. He was born in West Point, Tennessee.

RM: And do you remember the date?

Geneva: November 27, 1927.

RM: Tell me a little bit about his life. What did he do for a living in Alabama when you were growing up?

GH: In those days, the South was still trying to get their identity back and work was very, very far between. So a lot of the Southern people went to Michigan to work in the auto plants. And my father went to work in Detroit, Michigan, in the GM plant when I was two years old.

RM: Oh. So you grew up in Detroit, then?

GH: Until I was around 12 years old.

RM: What did he do at the GM plant?

GH: Built cars.

RM: And what was it like for you, growing up those years in Detroit?

GH: It was cold. I don't remember too much about the Michigan years. Dad worked in the GM plant. We did have a small business—we owned a Shell gas station in Flat Rock, Michigan. So all of us were working at the gas station off and on, helping the family out.

And we left when I was 12 years old. Mom took care of the gas station and the kids all pitched in to help Mom. Mom was always the strong one of the family and she was the one who kept the family motivating—go to school, go to work, do those kinds of things.

RM: What was her full maiden name? And when and where was she born?

GH: Her name was Dorothy Jean Killen Hollis.

Geneva: She was born June 5, 1930.

GH: Yes. In Florence, Alabama.

RM: And where is Florence?

GH: Florence is about 12 miles from the Tennessee border, and West Point is about 30 miles from Florence.

RM: And is it middle Tennessee or . . . ?

GH: No, it's right on the southern border, the southern part of the state. It's 27 miles from Lawrenceburg, and it's about 12 miles to the state line of Alabama and Tennessee.

RM: The reason I asked is I lived in both Memphis and Knoxville and just wondered if it was anywhere near.

GH: It's much farther south.

RM: Did your mother then grow up in Alabama?

GH: Yes, she grew up in Alabama. My dad met my mother through my dad's sister. My dad's sister worked in Florence and, from what I understand, my mother and my dad's sister were good friends.

RM: Then they got married and not too long after that moved to Detroit, right? Did they have children before you?

GH: No, I was the first. Then there was Brenda. And then there was Larry and Linda and Richard.

RM: Detroit was a lot different in those days than it is today, wasn't it?

GH: Yes. You know, it was a really industrial-type town. I mean, you had Ford, you had Chrysler, you had GM. And then, you had the transmission companies that were making transmissions for all these car companies. You had steel people that were making the frames and the auto parts companies that were supplying the parts to put in the cars. So it was a very industrialized state, but it was cold. I didn't like it much.

RM: Did the family feel that way too?

GH: Yes. I think it was colder back then than it is today.

RM: And growing up or being in Alabama must have been quite different.

GH: Well, yes, but I was only two years old when I left. I still had the roots of being a southern boy; and you can try to take the southern out of the boy, but it's really hard to do.

RM: What was it like being a southern boy in Detroit?

GH: I think by this time all the hostilities between North and South were gone. We pretty well got along as far as that. After a few years in school nobody knew where I was from, anyway, unless I told them.

RM: You don't seem to have a trace of a southern accent.

GH: I went back one time and stayed for a couple of years with my grandma, but other than that I've lived most of my life here in Nevada. My father had bronchitis really bad, and the doctor told him he only had ten years to live if he stayed in Michigan. We had some friends out here in Nevada, and they said it's a wonderful climate for bronchitis people. So we moved out here in 1960. We moved to Las Vegas, and my Dad worked for, I think, the Ford Motor Company—one of those dealerships here in Las Vegas. Then he went out and worked for the Test Site, probably around '65.

RM: Was he working in the tunnels?

GH: No. He was a mechanic and crane operator.

RM: My dad, Robert G. McCracken, worked at the Test Site, too, in those years.

GH: I moved to Las Vegas when I was 12 years old. It was really funny, because when I went to school, kids were wearing coats and I was wearing a T-shirt. It was warm here compared to where I came from. Soon after that, my dad and mom took a seasonal job in Kyle Canyon on the Spring Mountain. My mom was the cook and my dad was the maintenance person for the Girl Scout camp. My little brother, Larry, and I were the only two guys in the Girl Scout camp. We stayed up there in a trailer. Dad would go to work at the Test Site during the day, and he'd come back and take care of the equipment. So that was an experience.

RM: Was it kind of paradise?

GH: Yes, it wasn't bad at all. [Laughter]

RM: What do you recall about your early days in Las Vegas and Kyle Canyon?

GH: Well, Las Vegas was a different town back then. They were trying to get rid of the mob, and there was always talk about one casino or another being under mob influence. I can recall that we had very few bank robberies in those days. And if there was any killing done, it wasn't done in Nevada, it was done in Arizona or California. I didn't know why that there weren't any bank robberies, but I imagine it would be kind of stupid to rob a bank with mob money in it; you're not going to live very long. So the crime—the bank robberies and that kind of thing—was really down. The mob people just didn't want any kind of bad influence raining down on their hit parade. I think that they were kind of a law enforcement agency within a law enforcement agency back in those days.

RM: Yes. And did a pretty good job of it, from what I understand.

GH: If a dealer got out of hand and was caught cheating, they broke his fingers and toes over in California or Arizona. There was no record of it ever being taken into Nevada. They wanted to keep a low profile, and they didn't want to bring a lot of heat. But the heat was already on them in those days.

RM: And Vegas was so much smaller then.

GH: Oh, yes. We lived up around the Rancho and Washington area, and those houses back then were really expensive—14 grand a house, you know? And you can't even buy a house for $14,000 today.

RM: God, no. You can't even buy the sidewalk.

GH: I went to school at Hyde Park Junior High School; it's over on Charleston and Alta. Then we moved, and I went to another school, which was Robert O. Gibson on Washington, over by the Las Vegas Golf Course. Then I went to one year of high school at Western.

RM: And when did you go to work at the Test Site? Your dad was working there.

GH: To be truthful, all my family worked at the Test Site. My mom was the first female supervisor in REECo. She ran the casing yard in Area 6.

RM: You mean those big pipes they put down those shafts? Wow. She ran that yard?

GH: She ran the yard, and she had about eight people working for her. She also supervised Warehouse B in Area 12 at times, off and on. She had to X-ray every single piece of casing that went down a hole and all the pipe that went into an underground shot and a tunnel shot. All that had to be X-rayed before it went underground, to make sure there were no cracks, so that when the blast went off the pipe was able to contain the blast.

My sister Brenda worked at Warehouse B at Area 12. Her husband, Barry, was a

security guard at Wackenhut out there. I worked with the operating engineers. One sister, Linda, never worked there. Richard Hollis was a mechanic in Area 12. He worked out there for a year or so. Larry was an operating engineer out there. Whether it was one of my family members or a husband or a wife, the families all worked out there at one time or another.

RM: When you were working there, did you live out there part time or did you commute?

GH: At first, I commuted every day, which meant getting up at 4:00 in the morning, because you had to catch the bus at around 5:30 in the morning. When I decided I'd stay out there, I stayed three days a week at Area 12.

RM: That's where my dad was living. He was out there for 15, 20 years.

GH: Yes, there were little trailers, two men to a trailer. I think there were enough trailers out there for around 200 people.

RM: My dad and I started there in July of '58. I worked all one summer there, and we were living in those trailers.

GH: Let me tell you how I got to the Test Site. I was working for ABC Mine, a mining company made up of three different corporations. There was ABC, which was a mining company. Then you had Tenneco, which was a very, very large company and owned numerous other corporations. And you had Kern Land and Cattle Company. All three of them owned the ABC Mine.

RM: And where was it?

GH: It was in Death Valley at the Dante's View turnoff. If you turn off of the main road going to Dante's View, you'll see where ABC Mine sits on the east side of the road. We mined colemanite, ulexite, and proberite.

RM: Is colemanite the same as borax?

GH: It's a sister or brother to borax. Let me give you an example of colemanite: those little tiles on the space shuttle? Dishes, Owens Corningware? You can take colemanite and put it in the microwave and heat it up to 3,000 degrees, and then take it immediately and put it in the freezer and it won't crack. That's why the little squares on the space shuttle are made out of colemanite—because they can withstand the heat of reentry.

RM: Interesting. And what were the other two minerals there used for?

GH: Proberite—Owens Corningware used that for fiberglass insulation. And ulexite was a good fire retardant. It's very soft material, and you'd grind it up into a powder like flour. They would put that into a fire extinguisher and pressurize it.

RM: Was that a big operation when you were there?

GH: Yes, it was.

RM: How many men were working there, do you suppose?

GH: Between the mill and the mine, probably 250. I was working underground at the ABC Mine when I got the phone call. I was 1,200 feet underground and half a mile down the shaft. They called and told me I had a call, so I came up. REECo wanted me to come to work. I put my notice in immediately that I was leaving and went the next day to REECo in Las Vegas, Wyandot. I spent seven days there trying to get a security clearance. Took seven days. You had to take physicals.

RM: They wanted to know everywhere you had lived and everything, didn't they?

GH: Every place I had lived and every place I had worked from my sixteenth birthday. So I was frantic trying to find all this information, you know?

RM: Yes. I was 20 when I went through that, so I hadn't lived in that many places, but for my dad it took a long time. Back at the ABC Mine, were you an engineer or a miner?

GH: I was a core driller. I started out my mining and drilling career at ABC.

RM: How did you happen to get a job there?

GH: Well, they advertised in the paper, and I put in an application. My first job was rigging. We were putting machinery down the shaft. The machine would come to you on a big trailer, a low bed. They'd take it off, and then we had to tear it down piece by piece, because the shaft was only 14 x 14, and that Dosco was 30 feet long and 14 feet wide. There was no way you could get it down the shaft. And it was too heavy for the hoist to put it down there anyway. So the Dosco went down in 80-some pieces.

RM: And what is a Dosco?

GH: It's a continuous miner. It's on tracks, and you run it up to where you're going to start mining. It's just like a TBM, a tunnel-boring machine, except it takes a two-foot cut each time.

RM: So your first job was there?

GH: Well, my first working career was here in Pahrump. I've worked for all the major farmers in the valley. I guess I'm the last cotton ginner that's still around.

RM: We need to talk about that.

GH: I don't know if you ever heard of Johnny Bell. He was the cotton ginner at the cotton gin when we moved out here in 1968.

RM: So your family moved to Pahrump?

GH: Yes. We owned a parts house here called Valley Auto Parts. It was the oldest auto parts business in Pahrump when we sold it to Carquest.

RM: And when did the family start that business?

GH: I think the business started in 1969.

Geneva: Gary's mom told me when they were moved out here, and they moved

into a manufactured home. Well, the home came in and it was the wrong one, and they had to go up to the Cotton Pickin'—because that was the only phone—to let the people know that they sent the wrong one.

RM: What prompted them to move here from Vegas?

GH: I think it was closer to the Test Site. The commute wouldn't have to be as bad. You know, 95 in those days was called the "widow-maker highway." I don't know if you remember that.

RM: Yes, I do.

GH: A lot of Test Site workers lost their lives going back and forth on that two-lane highway. In those days it was open range, and there were still cattle grazing in the area between the Test Site and Las Vegas. So cows were on the road, and, of course, everybody stopped at Indian Springs and got beer. It took a lot of years before they four-laned it and it made it a safer road.

RM: Yes. So your family made the change to come here to Pahrump?

GH: Yes. My dad was thinking about retirement, and he wanted a small business, so that if something happened at the Test Site, he would have something to fall on to. And Pahrump was a good area for auto parts because it was 70 miles to Las Vegas for these farmers. We made our business oriented to the farmers and ranchers.

When Carquest bought us out about 15 years ago, we had stuff in there that they said they had no idea about. We handled stuff for tractors and farm equipment, because that's what our business was—taking care of the ranchers and farmers. Carquest said that some of this stuff that we had was worth more money today than it was back then. You can't get it. Like generators—you don't have a generator any more. We had a whole bunch of generators in there. When we went out of business and they bought us out, they

probably made a lot of money off of that generator, because you couldn't buy that generator.

RM: You couldn't get them, yes.

GH: You would have to find somebody that would take your old generator and rebuild it, and this way we already had them in stock. They were kind of dismayed at points and condensers. These days, there's no such thing as points and condensers.

RM: There aren't? I didn't know that.

GH: You've got electronic distributors today. But there are antique cars that still use points and condensers. So instead of having somebody rebuild the points and condenser, now they had them. Carquest said, "We can get rid of it. We can find a buyer for it."

RM: One of the things I've wondered about a parts operation is how do you know what to stock?

GH: Well, after a year or so we figured out what we needed. At night sometimes people would break down on Highway 372 or 160, and we were the only parts house. They'd wake us up, and Dad or one of us would go out to the parts house and look it up. If we had the part, we'd sell it to them.

RM: So when the family first came to Pahrump, they started this business, and meanwhile your dad was still working at the Test Site? And what were you doing at this time?

GH: In those days I was working on the ranches around here.

RM: What was the first ranch you got a job at?

GH: The Pechstein Ranch. Mason was leasing it from the Pechstein family. It was on the other side of Mesquite, just when you turned off of Highway 160 out of Mesquite, that first house on the left-hand side. That was the main ranch house. We had a big

irrigation pump, and the water went through a ditch all the way down. All the land on that side was the Pechstein Ranch.

RM: And they were growing cotton, mainly?

GH: Yes.

RM: What were some of the things you did on that ranch?

GH: Oh, I plowed; I disked. That kind of stuff.

RM: How long did you work for that ranch?

GH: Well, off and on; I'd work for other ranchers in the valley, but Johnny Bell at the gin had a heart attack so I went to work there. They had an old guy from Brawley, California, come down. He was taking Johnny's place, and I was his assistant. I would take care of the gin stands while he was doing other things. About four weeks into it, he just looked at me and said, "Do you think you can handle this?"

I said, "Yeah."

So he took off. Jacque Ruud was the manager of the ginning company here. It was called ACPC, Arizona Cottonseed Products.

RM: Walt Williams was out of it by this time? Or did he build the gin?

GH: No, Arizona Cottonseed Products built the gin, but at this time Preferred Equities had already bought Walt Williams out. So the old guy from California went to see Jacque, and we were going about our business ginning cotton, and two hours later I was wondering what happened to him. Finally, Jacque called me and said, "Can you shut down for a few minutes?"

I said, "Yeah." So, I shut everything down and went down to the office. I said, "What's wrong?"

And she said, "He left."

I said. “What do you mean he left?”

“He told me you could take care of it, and he was going back to Brawley to his wife.” [Laughter] He’d had all of Nevada that he wanted. She said, “Gary, do you think you can handle this?”

“Well, I don’t know, but I’ll give it a try.” So I went back to ginning, and I ginned that year and part of the next year. And they had a problem down in Palo Verde, Arizona.

RM: Is that cotton country?

GH: Yes. So I went down there and helped the ginner rebuild that gin. By then Johnny was back at work, so I was looking at not having a job. Elroy Greer—he was the head man for Arizona Cottonseed Products—decided that they were going to run the Palo Verde gin 24 hours a day. They had got a big assignment from a cotton grower over there by the river, so they needed to run it 24/7. I ended up going to Palo Verde to gin cotton on the night shift. My buddy Dave did the day shift, and I did the night shift. He was an Arizona boy. And the gin also had two ranches of our own, the King Ranch and the Love Ranch. The farmer had borrowed so much money from ACPC to get his crops in, and he couldn’t get out of the hole.

RM: So they took it over?

GH: Eventually they came in and dealt with both ranches—thousands and thousands of acres.

RM: Is that down in the Imperial Valley?

GH: No, it’s down toward Casa Grande, in that area. So I lived on the King Ranch, which was about five or six miles from the gin, in a nice brick home—me and my three kids and my wife.

RM: What had happened to the Pahrump gin? Was it shut down by then?

GH: No, the gin was still going, but we were down to 1,800 bales a year. In its heyday it was 5,000 bales a year. The gin cost was just too much for the farmers to be able to pay and make a profit. It was just too few bales per year for us to fire that gin up—put the electricity into it. So the gin had to close.

RM: So cotton production was dropping in Pahrump by then? When Preferred Equities bought the Pahrump Ranch, what happened then?

GH: A lot of people ask me that. When Preferred Equities bought the ranch, they weren't farmers. They had a problem because they had a lot of water rights, and in those days you had to prove up every year on those water rights. They didn't have a way of proving up on those water rights because they're not farmers. So in all that area where Saddle West is, and all the way back down, they were selling that land, but there was a stipulation in the deed that they could not build on it for seven years. They had to do something with it every year to prove up those water rights.

They were still getting Central Nevada Utilities going, so they could take blocks of those water rights and put them into the utility company and make them quash municipal water rights. That way they didn't have to prove up on them. But they didn't have it all done so they had to have some way to farm, to use the water so the state wouldn't take the water rights away from them. And so Tim Hafen and Bob Ruud were farming that area for them.

RM: In addition to their own land?

GH: In addition to their own. Bob Ruud had his over here, and Tim Hafen had his ranch down on the south end.

RM: What year did you go to Arizona, then?

GH: Oh, early '70s.

RM: And what were your dad and your family doing by this time?

GH: My dad worked at the Test Site, and mom took care of the parts shop.

RM: Oh, by then she was not working at the Test Site?

GH: Well, both of them worked at the Test Site, and we hired people to take care of it when they both worked there. Mom was there for about 10 years yet.

RM: So you were in Arizona, and you had your job with the gin down there. What happened there?

GH: The cotton production in Arizona went down, too. You have to put on a lot of fertilizer to raise cotton. We injected ammonium nitrates into the water and irrigated with the water. Cotton wasn't doing as well, because cotton takes a lot of nutrients out of the soil. They were looking at other crops that were more profitable to them and didn't take as much water and didn't take as much care, and that happened to be cucumbers. Del Monte and the pickle companies wanted pickles that were four inches long and so big around, so they were raising large amounts of pickles. And maize was another crop, for the dairy industry. Arizona Cottonseed Products and their two ranches had probably a thousand acres of maize, and we'd sell that to the dairy industry. And we had wheat and barley and stuff like that. Remember, farmers and ranchers grow crops that will make them a profit. When the cotton market went down and wheat went up, they grew wheat. When the wheat went down and cotton went up, they grew cotton. When they took off the night shift at the cotton gin, I went back to Nevada, and I went to work for the Test Site.

CHAPTER TWO

RM: How did you happen to get on at the Test Site?

GH: Well, you had to be a union member, you know? So I got a call out of the hall and went out there and went to work.

RM: You could just go down and join the engineers? You were in the operating engineers?

GH: Yes. It was a lot easier if you had a family member that was already an operating engineer. Dad was already an operating engineer, so I was. They had three lists—the C list, the B list, and the A list. If there was nobody on the A list and there was nobody on the B list, they took somebody from the C list.

RM: And that's how you got on from the C list?

GH: It was a little different with me. There were not a lot of core drillers running around. There was nobody on the A list, and there was nobody on the B list, and I was the only one.

RM: And you had learned core drilling at ABC?

GH: Yes, from a guy named Virgil Settlemire, from Amargosa. He taught me how to drill and core drill. He's dead now. He died about four years ago.

RM: What could you say about core drilling that sets it apart?

GH: Core drilling is a different type, because when you drill five feet, you shut it down, and then you retrieve a barrel inside, and you actually get a piece of core and that goes in a core box. Then your jaw just will go through the core and tell you to keep going or stop or whatever.

RM: So you do that in five-foot steps?

GH: You can do it in five or ten or 20. On the surface, you have the room to do tens and 20s. Underground, you don't have the room, because if you're in a 12-foot drift tunnel and you've got the rig set in the middle drilling into the rift, you aren't going to have ten feet to pull the core barrel back out.

RM: So that limited it?

GH: Yes, it limited it to five feet.

RM: Did you like core drilling?

GH: Yes, I did. I liked it because I could see what the ground was at 500 feet—I could actually see the color of the rock and what it looked like.

RM: Did you find any interesting cores when you were at ABC? Like cutting a streak of gold?

GH: No. What we ran into were large blocks of crystals. You could lose your water for a minute, and then it would come back because there was a void in there, and that's where all the crystals are. And then, when you got the core out, you would be missing about that much, and when you went back into the rock again, you would be picking up the crystals, colemanite crystals.

RM: Interesting. That must be an enormous deposit of colemanite there.

GH: Yes, but it's lost forever now. ABC gave it back to the Park Service.

RM: So it will never be mined again?

GH: No more mining there.

RM: So you had picked up these skills in Death Valley, and then you went to the Test Site. What was your first job at the Test Site?

GH: I was core drilling at G Tunnel.

RM: I worked in G Tunnel, when it was in probably 100 feet.

GH: They did, I think, ten nuclear shots in G Tunnel.

RM: What was it like to drill there?

GH: I did a lot of specialized stuff in G Tunnel. I mean, I worked for some oil companies in different places, and then I did some stuff for Yucca Mountain, some closure work. For the oil companies, I would drill a hole 100 feet.

RM: This would be a core, right?

GH: Yes. Then I would pull out, and they would pressurize the hole up and shoot dye into it. Actually, they'd seal the hole, then they would frac it. Fracking means that they would put so much pressure in the hole that it would frac the ground out there at 100 feet. Then we'd inject dye into the hole, and that dye would go, of course, through the fractures. Then I would go 50 to 100 feet on the right and left side of the hole and drill until I intersected the dye. The theory of that was that we could go back into oil holes—old, old holes that had gummed up and weren't producing—frac them again, and bring oil back into the hole.

RM: So it was an oil business?

GH: An independent oil company was financing the project.

RM: Did it work out?

GH: Yes. We brought in a well up in Wyoming, an old well that was not producing very much anymore. We used explosives, because it was a very deep hole, to do the fracking. And we brought it back.

RM: And now they're using the fracking with gas and everything, aren't they?

GH: Yes, but Sandia—that's who I worked for up at the Test Site, Sandia National Labs—brought in independent oil people to do it.

Then I did experiments for Yucca Mountain. One was to test the ground to see if

it could handle extreme amounts of heat. Remember, when you put a spent fuel rod into a drift or into a hole, you're hoping that the ground will be able to withstand the heat of that spent fuel rod. That's the theory. So we heated the ground up in this hole to extreme temperatures to see what would happen to the hole.

Now, we can't get it as hot as a spent fuel rod would be, but at 400 degrees, 500 degrees, whatever the temperature was, we found out that the tuff in the hole was not going to do it. Tuff would fluff in the hole, and it would start disintegrating. We did it in granite, which worked very well, but granite over at the Area 15 shaft was very, very fractured, which meant lots of water could get through. And that wasn't good.

They tested it in salt—some people did some drilling down in Louisiana in the salt domes. And salt did the same thing; it just fluffed in. It started to break up, which is not good. That's the reason why I say that WIPP down in New Mexico is not going to be the answer to the government problem of recycling and taking the products that they can't use and putting them into salt, because they're still radioactive. They're still hot, and the salt will start disintegrating. You can't have a repository in salt. I'm a firm believer that you can't do it.

RM: They've got a repository in New Mexico, but it's high-level waste?

GH: No, it's transuranic waste. It's plutonium, that kind of stuff. It's low level. It's gloves. It's uniforms. It's tools. And they're all in drums; and in this case, the salt will consume that. Wherever you mined out the drift to put the waste, over a period of time the salt will just consume it, enclose it, and bury it. But it's so low level that it's not a problem; it won't heat up. Spent fuel—you can have numerous spent fuel rods—in one capsule—the heat is going to be tremendous.

So we had to find a rock that could withstand the heat. G Tunnel was the only

tunnel that we had at Area 12 that had welded tuff. To get to it, we had to mine up from G Tunnel towards the mesa. We mined a ramp up, and we got into the really reddish-pinkish welded tuff. Then I did the heated block experiment there. I drilled numerous holes around so I could get this block—it was four feet by four feet all around—and put numerous holes in there; they were inch-and-a-quarter or two-inch holes.

RM: They were cores, right?

GH: Yes. Everything I did in G Tunnel was cores. We had to see what was there, and we had to test the rock. We put flight jacks in these side panels that I had drilled out.

RM: Now, what's a flight jack?

GH: Well, it's like a little hole slice. It was about a three-inch-diameter slit. We put those flight jacks in there, and that way we could move this piece of rock back and forth.

RM: Oh, so you had a block cut out of the wall?

GH: I would drill these holes as close as I could get them, and the miners would come out and chip it out. Then we were able to put the flight jacks in there. Then we injected a radioisotope into the rock and we had sensors outside of the rock to pick up any radioactive material. We were trying to move this rock back and forth, trying to get the radioisotope to move out of the block and into . . .

RM: Into the country rock?

GH: Yes. We couldn't do it. We heated everything we could heat it up with. We couldn't even touch it.

RM: How did you heat it up?

GH: They put heaters in.

RM: Electric heaters?

GH: They were about that long, about a foot long and three inches around. They put

them down in there, and then they'd have a source that heated up. We don't have the technology to heat it hot enough. Welded tuff is a volcanic layer, and it was extremely hot, and it was just moving. It was red. It was just a lava flow, one lava flow after another lava flow. That's what built Yucca Mountain. But evidently there was a volcano somewhere near G Tunnel, because that lava flow wouldn't be there if there wasn't a volcano.

So we don't have the technology to make heat like a volcano does. For us to make that rock flop in or disintegrate, we're going to have to come up with a lot more heat than what we have.

RM: You couldn't do it. But with as much heat as you could put in there, it worked?

GH: Yes. The rock will withstand large amounts of heat.

RM: What are some of the other projects you did at G Tunnel?

GH: We did all the closures for the nuclear shots. In a pipe shot, you have three closures. You have the faces, the backs, and the taps. One of them is a door that goes like this.

RM: They slide past each other?

GH: Right. And then the other is a round cylinder packed with explosives, and it'll do this.

RM: Like an iris?

GH: Right. And that was designed to close that way. There's a big door in the taps and it's got an explosive bolt up here. When the bomb goes off, a fraction of a millisecond after that, that explosive bolt will go off, and that door shuts. It's so heavy that, if everything goes right in those first two closures, there won't be anything for the taps to do. The door is so heavy so we can hold back anything that does escape.

RM: If the other two do leak, it'll hold it?

GH: Well, it has and it hasn't.

RM: Oh, sometimes it does, and sometimes it doesn't?

GH: We've had blowouts.

RM: So it'll blow out the portal?

GH: No. It doesn't get that far. You have numerous closures when you go out the tunnel, once you get out past the pipe. Going out you have several plugs that we put in and then you have the gas-sealed door at the entrance of the tunnel. That's this great big, three-foot-thick door of concrete and steel. And you have to close it with hydraulics, because there aren't enough men to push it closed. Inside that you have sensors. After the shot goes off, the scientists can go up to the gas-sealed door and see if there's any radiation on the other side of the door so they know what's on the other side of the door. So then your reentry team, I would say within 24 hours, will be reentering the tunnel.

RM: And what does that involve? Do you have to go through the doors then, or do they drill another tunnel?

GH: They have to get the hydraulics and open the door, the gas-sealed door. And then you'll have a plug. So many feet into the tunnel, you'll have another plug. So they'll run the continuous miner up to that plug and they'll check the radiation on the other side. If it's okay, they'll unload the continuous miner, the train will go back out and bring in the muck car, and they'll mine through that plug.

RM: So the tunnel was all caved in with the shot? Is that what you're saying?

GH: You won't see any cave-in. You've got several plugs that are about 30 feet thick in the middle of the tunnel. So what we're doing is here we have a plug in the tunnel. This is the gas-sealed door. So we found out it's okay to go in. So we go to the next plug

and we know that it's okay on this side, so we mine through that plug, and we'll go down here. And once we mine through all the plugs, then we're back to where the shot started. Then we'll start mining through the plug on the bypass drift.

RM: What's a bypass drift?

GH: Well, in a pipe shot you always have another drift going.

RM: Parallel to it?

GH: Parallel to it, and then a drift going over. Now, a lot of your experiments will be in bypass drifts. Like we built a submarine in there one time—a big piece of pipe that looked like a submarine. We put missiles in there.

RM: To see how they're going to hold up, right?

GH: To see if the blast will set it off. I think they put a tractor-trailer truck in there once to see what it would do.

RM: But you need the continuous miner to go through the plug? Is that it?

GH: Yes. Well, you don't want to use explosives, because you want to be very careful. We use the continuous miner for safety.

RM: Because the plug is 30 feet thick. It's not reinforced with steel, is it?

GH: Oh, yes.

RM: So the continuous miner can go through reinforced concrete?

GH: Well, it's not what I call reinforced. There may be some steel in there. But remember, REECo had developed, I don't know, 60 different grouts they used in their shots, like concrete. They developed these concrete grout forms to what it would withstand and what it won't.

RM: Oh, some are stronger than others?

GH: Yes. Some of them we poured as slump. It would stand right up with very little

water. They wanted to cure it fast. They wanted it to set up fast.

RM: Now the plug has to go to the wall of the tunnel, right? Even beyond it?

GH: Here's where your steel would be—going into the rib. You'll have a cut-out spot that's in the side, and then they'll drill the steel into the wall. They'll make their form, and then they'll pour it full.

RM: I don't understand how they would fill a plug. How do they fill a plug from the top? Because they've got the roof of the tunnel.

GH: You mean the back?

RM: The back, yes. How did they do that?

GH: We used numerous pipes. We'd put a pipe in, put another pipe in, put another pipe in. If this one plugs up, we'd go to the next one. If this one plugs up, we'd go to the next one—we'd continuously do that. And then, we'd drill up into the back. And remember, where you have these grooves on the side, you're going to have a pipe up there. And then we pressurized that grout up in there until we couldn't pressurize it any more. So that means that plug is full. It goes clear to the back.

RM: That's really interesting. Was your job to run the continuous miner?

GH: No, I didn't get into that. My job was to be ready when they got back to the bypass drift, and my drill rig was set up outside. It was set up probably four days before the shot, and within four or five days I was in there drilling a hole into ground zero. We've got to know what kind of radiation is in it.

RM: And what was that like? I mean, you were right there at the belly of the beast, weren't you?

GH: We developed techniques to keep us safe. We never drilled straight in. We'd drill up at a 45 degree angle because we're going to get a little contamination once we get to

the cavity of ground zero, but not much. And once we break in there, the water is going to go inside the cavity and come back. We had to contain everything that was over the background. So if the background was 1.8, and we had background material that was 2, it couldn't go outside; we had to store it underground. We had great big drifts that we had mined out, maybe 50- or 60-feet wide, 200 feet long.

RM: At G Tunnel?

GH: Well, not at G Tunnel, because we didn't see any more shots at G Tunnel. All our other shots were normally at N Tunnel, T Tunnel, and P Tunnel. I, J, K were all shot up. A, B, C, D, E were all old shots. They were all closed.

RM: And they're all in the Pahute Mesa?

GH: All of them, yes.

RM: I've heard there's a cavity in there. Is it a big cavity or a little one?

GH: It depends on how big the shot is. They're not peanuts, I can tell you that.

RM: Did you ever go actually into a cavity, or did you just drill into it from a distance?

GH: It's very, very, very hot in there, and you have all kinds of radiations. You've got alpha, beta, gamma. You could have X-ray.

RM: And I've heard it makes a glass.

GH: The rock turns to glass, and that's what's protecting our water today. The glass from those shots is keeping the water from coming outside. That's our only protection. If the glass breaks, then we could have contamination. Have you ever seen a beehive? Or a charcoal kiln? Have you ever seen how those are?

RM: Yes.

GH: Well, we mined those underground spaces just like that. We suspended the device from the top. It just hangs there, and then they explode it. Lots of times you can go right

back in there and take the experiments out with no problem. There's not a lot of falling or anything—you know, the back falling in?

The last one I was on was a very, very small shot, a little peanut. We couldn't even tell that we shot it off. Twenty kilotons, 30 kilotons—that's big. Half a kiloton—that's a peanut. But the radiation was tremendous. I was suiting up double and triple suits. I could stay in an hour and a half and drill, and I had to come back out for three.

Everybody thinks the bigger the shot, the more radiation. That's not true. And I'll tell you why. This shot was so small, there was not a big fireball. In a big shot you're going to have a big fireball with tremendous heat that's burning radiation. The smaller the shot, there's not a tremendous heat so it's not burning that radiation up. So we learned something very valuable. The bigger the shot, the more radioactivity is not necessarily true.

RM: What was the biggest shot you ever worked on? Or do you know?

GH: You have to understand that when you're working for the federal government in a very dangerous occupation, you're not necessarily privy to all the information. You're told what you need to know to do your job. And in a lot of cases, you may not want to know. One thing I won't talk about is my security clearance. People that work at the Test Site should not be talking about their security clearance, because you become a target when you do. There are certain things that I won't talk about—yields and that kind of thing, I think, are out of my expertise.

RM: I asked a guy who was in somewhat of a position to know if they stored A-bombs out at Nellis. And his answer was, "You don't want to know how many A-bombs are stored out there."

GH: Well, you know, it's the same way with the old rumors that go around that there

are three out there at the Test Site that never exploded. They pulled the pin, and it didn't go off. That's the old tale. I don't know. But I've heard that ever since I went to work out there. There were three of them over the years—they pulled the pin, and they didn't go off. Now, are they going to spend $200 million going after it? They might be making the whole thing worse. Might be best to just leave it there. It won't go critical.

RM: Did you ever work in the big bores they did, the vertical bores?

GH: I didn't do very much drilling on those big rigs until after I left the Test Site. Then I worked on the rigs up in Gabbs, on an oil rig up in Cactus Spring. Most of my stuff was the sort of drilling that's underground.

RM: On reentry, did you always have to suit up?

GH: That's what you've got Rad Safe for. Most of the time on a reentry, you're going to be suited up, and Rad Safe is not going to take chances. On a reentry you're going into a hostile environment. You're going to be in coveralls; you're suited up.

RM: And they're monitoring your exposure as you work?

GH: You have a device that looks like a pen. You have the little glass here, so they could look in and say, "Oh, yeah, you've got this much or that much."

RM: And then it's time for you to come out?

GH: Generally, all you have to do is shake it real hard, and it will go back to zero. And remember, at G Tunnel we had to take a piss test every 30 days. There's a lot of humidity in G Tunnel. It's a tritium tunnel, and you can absorb tritium through your skin. Now, at N[JE1]-Tunnel you didn't have to do that test.

RM: Why was humidity a concern?

GH: Well, humidity picks it up—the tritium is in all the water. Everywhere. There's a small amount of tritium in all the water, even in the water here. So you're absorbing that.

Those devices, I guess, gave off a real high tritium rate. So we always had to take a piss test every 30 days for tritium at G tunnel.

RM: What other tunnels did you work in on your career out there?

GH: I've worked in A, E, T, P, and G, among others.

RM: Does anything about those stand out in your mind?

GH: They're all really small tunnels. They're old. You can go into E Tunnel, but the rest of them are all bulkheaded off. There's no scientific value left anymore.

RM: And you worked in all those?

GH: And N Tunnel, on both sides. N Tunnel had two drifts—an old drift that was started years ago, and then we took a TBM, a tunnel-boring machine, and started a new one. We made another drift into there.

RM: If they drilled a tunnel out there now, they wouldn't do it the old-fashioned way—guys with jumbos and blasting and all that?

GH: It depends on the rock. I mean, the rock is always the thing, you know? How much of this hard rock you've got to go through. TBMs are very good with hard rocks, and with lighter rocks they're not very good. Remember, with a TBM you've got to put pressure on the . . .

RM: Pressure against the face, yes.

GH: And if that stuff is breaking up before it, you cannot; that's the theory. As long as the TBM is right against the face of the tunnel, and it's turning, grinding, and not making great big hunks, it's grinding that up pretty well. If it's breaking up a foot or two ahead of you, you're always moving the machine forward. You're having to move this machine forward all the time.

RM: Did you operate the TBM, or were you just doing the cores?

GH: No, I never operated the tunnel-boring machine.

RM: You were a corer?

GH: Most all the things that I did out there were core drilling. And I ran the trains when they needed me to.

RM: You operated those trains that went in and out?

GH: When we did a shot, and it got down to pretty close to time to detonate, you had two trains—one going in and coming out every 30 minutes. In an eight-hour shift, you could have 1,000 people come in and out of that tunnel.

RM: That many? I had no idea. Were those trains battery operated?

GH: No, they're diesel.

RM: How far in were you on some of those shots?

GH: N Tunnel was two and a half, three miles. I think N Tunnel's the longest tunnel.

RM: So you needed a diesel to get in there.

GH: Well, you're pushing pipe that is 20, 30 feet long and big enough to drive a truck through on a low boy, and you've got to push that all the way in to ground zero. Remember, everything's got to be checked to make sure everything we put on the flat cars can go down the tunnel.

RM: And then, do you weld the seams when they put each segment of pipe in?

GH: Yes, they're welded. And then they have to be X-rayed.

RM: And that's so it contains it properly, is that the theory?

GH: Unless it gets out of the three containment doors—what we call the doors, the closures.

RM: Yes, and the pipe is part of that?

GH: But again, it doesn't always work.

RM: And then, when they got ready for the shot, they would take you guys out of there, right?

GH: Oh, yes. Ain't no way they're going to keep me in there. I'm out of there. [Chuckles] When we do the shot, and we're buttoning up—it's called "button up." Everything's got to be done. We pour a closure. Back out. If we move anything—a tool on the ground, anything that could fly around—we pick it up, and we just button everything up all the way to the gas-sealed door. When we close that gas-sealed door, nobody goes back in.

RM: And you're making plugs as you're backing out of there? And there's no way to get past that plug?

GH: Not unless we bring a miner in and mine through it again. There is one small door in the gas-sealed door that can be opened, but that's it. The other plugs are plugged solid. There are no doors. There's no escape. There is one door there, and I don't know what it's for—maybe in case they left somebody in there at the last minute or something.

CHAPTER THREE

RM: Are there any people that you worked with out there before your Yucca Mountain experience that you might want to mention? Did you know Frank Solaegui?

GH: Solaegui? Yes.

RM: He was my walker, I think, the summer I worked there.

GH: Yes, Solaegui was a good guy.

RM: Yes, he was. And did you know Bill Flangas?

GH: I know Flangas. Yes. I've had a row or two with him. [Chuckles] When I started there—I'll mention this guy's name. He was a hell of a guy. His name was Enos Cooper. His employee number was 997; he was the 997th person hired by REECo. My number was up in the five or six digits. He knew everybody. He helped build the road going into Mercury.

RM: Is that right?

GH: He was a laborer, and then he retired from the labor and became an operating engineer. He was my first helper in 1980, and I'll never forget, we were taking a break, and he was just sitting up against the rib, and Bill Flangas walked out in the drift. Enos jumped up, just giving him hell. Flangas is a big shot now—I mean, he was the No. 2 man. Enos said, "You always make a racket before you come in here, and me without my safety glasses on." [Laughter]

Flangas and Cooper broke me in. He started there in the 1950s. The Test Site wasn't even opened in 1950. There were three Cooper brothers—Charlie and Enos, and I don't remember the other one. But they were 997, 998, and 999. They all came to work in 1950. We called him the Test Site baby. [Laughs]

RM: Do you have any more Test Site stories? Somebody ought to make a collection of them, because that's our history.

GH: You know, the problem with your memory is you get away from it for so long, and it takes something to trigger that response. When I'm talking to you or to Darrell Lacy at the Nye County office, you'll trigger something, and I'll remember. And you'll say, "Well, you didn't tell me that." Well, I just now remembered it.

It's just like P Tunnel. It's the newest tunnel of all of them. It was so high tech. It's not like the other tunnels that I had worked in. It's bigger. We learned a lot of techniques working in the older tunnels. And it's just a nicer-looking tunnel. You have pipe in there right now. The pipe is set right in there as it's supposed to be. If the President was to give the order to test, that shot is ready to go. All they have to do is put the device in and start welding the pipe up; the bypass stuff is there; everything is there ready to go. The pipe was already bought and we didn't want it sitting out in the weather so they just put it in there.

RM: What would happen if you and several other people could get together and tell Test Site stories, jogging each others' memories?

GH: Yes, that would be a good thing, if you could find those people anymore. I just saw an old guy I worked with out there the other day at Wal-Mart, and he's got cancer—not that he got it from there. But I've got diabetes real bad. I guess that's the reason why we're doing this. You don't know how long I'm going to be here, Bob.

RM: That's right. None of us know that.

GH: And in my time as a commissioner the Nye County Commissioners have been very good about doing oral histories. We couldn't have done this, though, if it hadn't been for the Department of Energy. That's how we have the money to be able to do this.

So let's give credit where credit is due. We have commissioners that want this done. But if it hadn't been for good people in the Department of Energy financing this, it would not have been done.

RM: That is absolutely true. And a lot of credit goes to the commissioners for wanting to do this.

GH: My director of NWRPO, the Nye County Nuclear Waste Repository Project Office, is really on this project, and he keeps after me all the time about, "Let's find another project, so we can get it done." Darrell Lacy is a strong proponent on these oral histories.

RM: Yes. I think that we have got an archive on Nye County history now that no other county in the state has and very few counties in the United States have.

GH: And it's all because we had good friends in the Department of Energy that said, "That needs to be done, and let's give them the right to use the money to do that."

RM: That's right. And the interviews I'm doing now with some of the people are from the Yucca Mountain project who have firsthand experience with the project.

GH: Well, you've got Dr. Voegele. He's been in there from day one. I worked with him at G Tunnel on some other projects.

RM: He took me through the whole Yucca Mountain experience—we talked for many hours.

GH: Yes, these doctors and professors can talk. They made their money off of talking.

RM: That's right. So we've got firsthand accounts now. If Nye County hadn't done this history work, I don't think it would have been done. What we can do is find out what went wrong with Yucca Mountain. I mean, how is it they spent all that money and came up with nothing, at this point? I think Yucca Mountain is eventually going to happen. It's

just going to take more time.

GH: A guy said to me not too long ago, “It’s a good thing that they got the blue ribbon committee that’s going to study this.”

And I said, “Well, I don’t know. We’ve been studying this for 40 years.” We probably have a name for every doggone bush on top of that mountain. Every wash has probably got a number. Every canyon is probably named. Every boulder probably is documented. So I mean, how much do you want to study one mountain?

And what else are you going to put the waste in? Salt? That’s insane. It’s never going to hold up. I mean, maybe you can find some mountain in the middle of the ocean you can put it in. You’re already bitching about a little oil. I mean, what are you going to do with radiation?

RM: It was the politics that did it in, and those politics will change. That’s my feeling.

GH: It’s not going to change until we get another Congress and probably another president. I really don’t think that the president cares one iota whether it’s Yucca Mountain or anyplace else. I think that Obama needs Harry Reid to get his agenda through the Senate, and as long as Senator Reid is the Majority Leader of the United States Senate, Obama is going to use Yucca Mountain to help his political agenda. That’s what I think.

RM: I agree. I’d like to go more through your Test Site career and then pick up when Yucca Mountain came on in ’82.

GH: Well, most of my career was going from one tunnel to the other tunnel. We had different techniques, like cable holes. The reason we cored them is we can keep a straighter hole than a conventional bit. So you’ve got a drift here and got a drift here. And I got an experiment that I want hooked up into the pipe. I’ll core a hole right here. Now,

the thing about it is that's only a two-and-a-half-inch or four-inch hole. I need a 12-inch hole because I need to shove all these cables in the hole. So we're going to take a four-inch cut. I'll run my pipe, my drill stem, all the way through here and then put in another bit that's reversed. So I'll reverse my rig back here and pull.

RM: And pull it through?

GH: I'll pull it through.

RM: I didn't realize you could to that.

GH: So all the cuttings now are going out the other drift. I'm going to pull this out and, okay, I'm four; now I'm eight- inch. So now I go back in with my drill stem, hook on another bit that's reversed, and pull it through. I can pull it faster than I can push it.

RM: So that's how you did it after you put the first one in?

GH: Yes. I did them as high as 36 inches. Sometimes we have to put stabilizers in there to stabilize that pit, because that drill stem is limp; it's just flopping around because you've got this big bit hanging on here. Your drill stem is looking like this now. So we made stabilizers—round stabilizers—that go in there, and that just perks everything back up once we start pulling on it. A perfect hole.

RM: How many feet a shift can you drill with, say, a two- or three-inch hole, typically?

GH: It all depends upon the bit that you're using. We used diamonds, and of course diamonds will cut anything except welded tuff.

RM: A diamond won't cut welded tuff?

GH: It cuts it, but it doesn't like it. [Laughs]

RM: Does it wear the bit out?

GH: We used impregnated diamond bits—the diamonds are impregnated in the metal. The metal is softer than the diamonds. The rule of thumb is you wear the metal where

new diamonds appear. Our problem ended up being, in welded tuff, you polished the diamonds down before you could wear the metal away. In that case you had two or three things that you could do. One was to take a file and file over the top of the bit, to wear away some of the metal so the new diamonds would appear.

The thing about that is it got very expensive, because once you raked the file over the diamonds the file was no good anymore. It wouldn't file off anything; it was done. We were paying $10, $15 apiece for these files to file these bits, and we were going through them like hotcakes.

Another way of doing it, depending upon the bit, is you can take a hammer and just chip at the metal, and it will wear away and doesn't do anything to the hammer. But if you hit it too hard or hit it the wrong way, and you take a chunk out of the bit, that's $2,000 down the drain.

RM: Is the welded tuff harder to drill through than granite?

GH: It's about the same. Both of them are—pressure-wise and in density—about the same. Granite is a little harder than welded tuff, they say. You can't prove it by me. The only thing about granite is it's really fractured rock. Welded tuff is not as fractured. And sometimes fractures cause you problems, because when you're drilling and you hit the fracture where it's broken up, then your core gets caught in your barrel the wrong way and it won't push in. So a lot of times, you have to pull the core and start all over again.

RM: In a typical shift, how many feet would you get if you didn't have any problems?

GH: Well, you've got to remember there's a difference between working in the private sector and working for the federal government. They don't call the Test Site the "rest site" for nothing.

RM: That's what they used to call it?

GH: Yes, the rest site. I got chewed out. When I first went out there I was green, new. I came from the private industry—mining—where our job was to get as much in a shift as possible. Well, my first day, I drilled 70, 80 feet. The next day I got chewed out because I was putting a strain on the F&S inspectors. As I told you, every five feet that you drill, one foot has to be wrapped and waxed for history. People don't understand that, but there is a core library at Mercury, and that library has core for every five feet that was drilled. The cores have to be kept for history and for verification, in case somewhere down the line somebody sees that there was a problem in the rock and they dispute the geology. They'll go right to the core library, pull that core out, look at the rock, and say, "No, I was wrong. The rock is there, it verifies exactly what the driller did and the density of the rock and the hardness of the rock."

RM: What was their thinking in saying you were drilling too much the first shift?

GH: Well, it put a strain on the F&S inspectors. F&S inspectors do the wrapping of the core and keep a record of the footage that I'm drilling. They're not allowed to stick a tape in my hole, though. I tell them, "We've drilled five feet; we're at 90.6." And then they mark it down; they keep a record of the core that they're wrapping. They do measure the core that was taken out of the hole. They say, "How far did you drill?"

"I drilled five feet."

"Okay, you only got 4.6 back." So I lost four tenths of a foot.

RM: So you lose a little sometimes.

GH: You could double-tube the core barrel. That helps you save core, but it slows the process down. We only double-tube when we're in really soft material and we want to make sure that we catch it, like when we're going into a cavity or into ground zero. We want to catch that five feet from the ground into the cavity.

RM: And what is double-tubing?

GH: You have a tube about that big around. In a four-inch hole you're going to get a two-and-a-half-inch core. There's an inner tube that's called a split tube. You put it together, and you slide it down your tube that you're drilling with. And then that split tube helps save whatever you're drilling.

RM: So what did you end up drilling a day, given the F&S requirements?

GH: The normal was 40 feet a shift. We bought some new drills, and they wanted me to really push it and see what they could get out of the drill. I drilled that shift 150 feet. And F&S said they didn't want to ever see that rig again. I told them, "It's not the rig, it's the bit." It was a new bit that they called Stratapac. It had diamonds, and then it had carbide tips and the tips of the carbide were angled so that it would cut. It was a wicked bit. It would cut that tuff like it was butter. But the bit's no good for welded tuff. You wouldn't get five feet.

RM: The welded tuff would just tear that carbide up?

GH: Yes, it would tear that carbide right up. It's a good bit for other rocks and other soft materials, but, no, there's absolutely no bit that I know that likes welded tuff. Absolutely none. It's the hardest rock I ever drilled in.

RM: So it does make a good site for the spent fuel?

GH: Yes. You know, granite's a good rock. And like I said, we went to Area 15 at No. 15 shaft (Clinch Mine), and to be truthful with you, the 15 shaft was an experiment on how to put the waste down a hole and put it in its containment vessel and do all that handiwork by robot. When we went down there and drilled the holes for that project and did some heater tests, we found out that the granite was way too fractured and was not going to hold heat. The heat goes to the rock and into the fractures. And then that heat's

got to go somewhere, so it's going to try to work its way to surface or go wherever the fracture's going. The rule of thumb is that if the heat can get into the fractures, then there could be a release of radioactive material to surface, and that's not a good thing. So we discounted granite as being a good candidate.

You know, at one point there were three sites considered for nuclear waste storage. One was Hanford, Washington. Another one was in Texas.

RM: Deaf Smith County, yes.

GH: And the other one was Yucca Mountain here in Nye County. Those other sites couldn't even come close to the Yucca Mountain site.

RM: Tell why. This is really important.

GH: Well, Hanford is a place where there's a lot of water. And Texas has more rainfall than we do. The ground is not capable of holding the heat. Like I told you, we sent people out doing heater tests all over the place in different types of rock. We did it in salt, and salt was not a good candidate because the heat would build up in the hole, and the hole would want to fluff in and disintegrate the salt. That's not a good candidate. Washington has a lot of water, and that made it a bad candidate.

RM: The Washington site was in basalt. Does basalt, without the water, hold very well? Basalt's a hard rock?

GH: Yes, I think it would be a good candidate. I think it could hold heat. It's not as fractured as some other material. The only thing is that there's too much water at Hanford. They have the problem already at Hanford, with the tank farms that they have there. They have two. One is a real old tank farm. A tank farm is where they're holding radioactive liquids in these tanks, and that's probably from holding ponds that they put the spent fuel in after it's taken out of the reactor. The spent fuel has to cool for at least

five to seven years before you can put it in a dry cap. If there's a problem with the containment pond, they have to move that water so they can get in there and repair it. There's a lot of water in these tanks.

The old tank farm is leaking; it's deteriorating. Its life span is over, and it's leaking into the river there at Hanford. We're trying to slow it down now with some drilling techniques and other things, but it's not going to be the solution. The solution is to make that water into glass and hold the radioactivity in the glass, and then the glass goes into a cask, the cask goes into a bigger cask, and it's shipped to a repository where it can be stored safely for the next thousand years.

RM: And that technology is all there.

GH: Absolutely. I don't know if you know Paul Golan. He was in charge of OCRWM, Yucca Mountain. He's a very good friend of mine; I respect the guy very well. When he took over, he came up with one brilliant idea. We were going to take the waste, say, from New York, ship it to Yucca Mountain, then take it out of the transportation cask and put it into a burial cask, and then put it underground.

Paul said, "That's not a good idea. Whatever we put it in in New York, that's what it's going to be buried in. There's no sense of us taking it to Nevada and then taking it out and putting it in another cask. That's where we're going to have accidents. If we're going to have people contaminated, it's because we're handling the fuel too many times. So let's reduce that. Once the nuclear people put it in a cask, that's the cask it's going to be buried in. When it gets to Yucca Mountain it's marked Drip 1, 2, 3, and it goes to 1, 2, 3." That was a brilliant idea. I thought that the less that we have to handle that spent fuel, the better off we're going to be.

RM: Plus, it would probably be cheaper, because every time you handle it, it costs

money, doesn't it?

GH: Absolutely. It's not just the time that you're putting in. Remember, you have to be suited up to handle these spent fuel rods. I mean, you're not going to go and just put on a set of coveralls and a hardhat and a mask. You have to be in a very high-tech contamination suit.

RM: Talk about that suit. You wore them didn't you? What is it like, and what does it consist of?

GH: I have worn them. Very hot. It's a rubber-like material in some cases. And you have a self-contained breathing apparatus on your back.

RM: You're not breathing outside air at all, are you?

GH: No. Or you have the suit that you can hook up a hose to that gives you the air you need to breathe. You're not going to go in these drifts in a pair of coveralls and come out safely.

RM: You're wearing a hood with a visor and the whole thing?

GH: Everything. You're in a suit that is absolutely sealed off from the environment around you.

RM: It's sort of like they would use on the moon, right?

GH: Absolutely. It's going to be something like that. Well, if you look at the moon—there's probably a lot of radiation up there. You have particles that we don't even know about. But when you get into these suits, you're going to be completely sealed off from the air outside of the suit. So you're breathing whatever's in that hose or whatever's in that pack on your back.

RM: And that suit is shielding the radiation out, right?

GH: Well, we know a lot about radiation now. If you take alpha radiation, it's not even

going to penetrate my skin but it's going to penetrate a cut, or when you breathe it. Beta will go through this sheet of paper. It will probably go through the first layer of my skin, but that's as far as it's going to go, unless it gets into a cut or unless you breathe it.

But X-ray and gamma—there are no bets on that. Some people say, "Well, we just use lead, and that will stop the radiation." Yes, that's true, in a sense. But if you have that radioactive source against lead for a long, long time, eventually it's going to go through the lead. Lead is a barrier. It's a long-time barrier for radiation. When you work with radiation, the more shielding you put between you and the source of the radiation, the safer you are. That's the reason why, when we go into some of these places, they calculate how long we can stay in.

RM: They know how much is going to go through in a given amount of time.

GH: Right. So they'll say, "Okay, Gary, you're going to go in there for an hour and a half and drill, and then you've got to come back out, and your body's got to rest for three hours." So on a cavity shot that I worked on at P Tunnel, the rule of thumb is I only worked three hours in that eight-hour shift.

RM: Is that right? But you were on the site that time.

GH: Yes, I'd work an hour and a half and go outside. Somebody else, another drill crew, would go in and continue drilling. I'd sit out there and read a book or twiddle my thumbs for three hours. As soon as they came out, then I could go back in. That's another way of shielding. You try to put whatever you can between you and the radioactive source. The less radiation you get, the better off you are.

RM: And what was it in the suit that was shielding the radiation, do you know?

GH: I couldn't tell you that.

RM: It wasn't lead, was it?

GH: No, they use some kind of rubber-plastic thing. That's why they limit you to an hour and a half. They kind of figured out that that's how long it's going to take the radiation to penetrate the suit. So then they have safety calculations. It could have taken two and a half hours to go through that suit. Then the safety people would have said, "Okay, if it takes two and a half hours to get through the suit, let's take an hour off that for safety precautions and make it an hour and a half, and then let them come out for three."

RM: What does that suit weigh? Is it heavy?

GH: Anything you put on your body, when you're going underground or you're doing stressful work, is heavy and awkward because you're not used to doing it.

RM: What do you think it weighed, 40 pounds?

GH: Oh, I don't think so. Maybe 15, 20 without the breathing apparatus.

CHAPTER FOUR

RM: Did you ever get a sense of claustrophobia in the safety suit?

GH: No. But that's one reason why I wanted to create this training center for fire and emergency services. We have to know what people's limits are. If we're putting a person in a confined space, before we put him into that position we need to know things. If he freezes in the middle and I've got people behind him, he's putting those people behind him or in front of him in a safety problem, because now they've got to quit doing what they were doing to rescue him. And then, somebody else is in jeopardy on the other side. I thought it was well worth the 300-some thousand dollars.

RM: Tell us some more about that.

GH: We're making a training center up here on Mesquite. It's a ten-acre site. Everything on the site is portable. If the county commissioners in the future decide that that ten acres is better used for another purpose, we can move the training center. These are stacked containers made especially for us, and we can entice fire into these containers.

So we're putting a person in a real situation to see if he can handle the situation and to see if he can put what he learned in training to the real thing. That was the whole reason for doing that—being able to keep the HAZMAT people from going to an incident and making a mistake. Now they can suit up, and they can do things on the training site and get used to wearing the suit.

There's always a way of suiting up. It's just not putting the damn thing on. There's a procedure for putting it on, and there's a procedure for taking it off.

RM: And you can screw up.

GH: Especially taking it off. The gloves are the last thing you take off. Because everything on your outside of that suit is hot. So if you take your gloves off, now you're contaminating your hands. You can't take the suit off until you take the booties off. There are two layers of protection on your feet. One is a plastic bag that you put on first, and then you put the booties on. So to get the coveralls off, you take the booties off. You're still protected, because you've got plastic on there that's taped on. Now you can take the suit off. Then you can go to the hot line. One at a time, you take the booties off, and you cross the line, and at that time you can take your gloves off.

RM: And you had to do this every time, right?

GH: Every time you go in; every time you go out. If I went out—if I took a break with my helper and said, "Okay, we're going to take five minutes or ten minutes, 15, whatever," which they encouraged us to do, I had to take everything off. And when I got through, 15 minutes later, I had to come back in. I had to suit up exactly the way that the procedure required.

RM: Do you use a different suit or the same one?

GH: A different one, because once you take it off . . .

RM: Because the other one's hot, yes.

GH: You've got what's called a hot line. On this side it's hot, on this side you're clear. Nobody can go across the hot line unless you sign in with Rad Safe and you're suited up properly. That's what they're there for. They monitor all of it. They monitor your hands, monitor your feet. That's to keep contamination from leaving the worksite. And they're very, very strict about contamination leaving the hot area.

RM: And then do they clean the suit that you've taken off?

GH: Everything goes into big plastic bags. They're sealed with radiation tape that says

"radioactive." Then they go somewhere, and somebody does the cleaning. But I can assure you they're suited up. When they open that up, they're suited up into some degree to wash those materials.

RM: When you were going back into a shot, at what point did you have to start suiting up, or did you start suiting up from the very beginning in a recovery?

GH: No. You don't suit up until you get to the hot area. You know, radiation doesn't work that way. If radiation's airborne, nobody goes in. They're going to send a team in there to find out why we have airborne radiation. I mean, if the whole tunnel is hot, then we've got a problem. And we've had problems like that before. In a bit we'll talk about Red Hot, a shot over in G Tunnel where we had some of those problems.

People think that radiation is dangerous, the most dangerous thing in the world. Yes, it is. And so was electricity. When we brought it into this world, electricity was very, very dangerous, and everybody was talking about getting shocked. People were dying because they didn't know how to use it and so forth. So every new technology that we come up with is dangerous, and, yes, it will hurt you. People have died from electricity. The automobile—same thing. It came in, and everybody was, "Oh, that's a dangerous thing. I'd rather drive my horse." Yes, the automobile was dangerous. Yes, the automobile killed people and still does today. It's probably killed a whole lot more people than radioactive material has.

RM: If we do a book on Yucca Mountain, what you're telling me here is really important to include in it.

GH: I want people to understand that the state of Nevada says that welded tuff is not the right rock. Well, I've drilled in just about everything and I don't know what the right rock is, if it is not welded tuff. I think it's a smokescreen by the state of Nevada. Either

that or they have very bad geologists working on their staff, because welded tuff is a magnificent rock. It's been heated more than any of us can even imagine. Remember, this rock was in a lava flow and it was red and it was hot and it was liquid. It was not a rock at that time. It was flowing in a path, and that's what made that mountain. I'll guarantee you we don't have the technology to make that rock melt today, not without probably very hard damage to the environment.

RM: You'd have to put it in a blast furnace or something, and maybe even then it wouldn't melt.

GH: You're talking thousands of degrees. If you look at welded tuff, you can see where the heat has actually turned rock and sediments into glass. It's a fantastic rock; it's very hard. I would be willing to say that that tunnel right now probably could take a direct hit from a nuclear missile. If somebody fired a missile and hit the rim of Yucca Mountain, I think the mountain could withstand it. It couldn't stand multiples. Nothing could withstand multiple hits.

RM: There could be an argument that all that spent fuel is in there, and somebody could hit it with an H-bomb, and then you'd have a mess. But they couldn't break the mountain.

GH: I think even if they broke the mountain, all they'd do is bury the casks. Where the study tunnel is that goes around, you've got to go another 200 or 300 feet below that before you get into the repository stage. And that part of the welded tuff is even harder.

RM: Is that right? So it's really the perfect site, as far as humans know at this point.

GH: That's my opinion. I don't want to speak for my fellow commissioners, but it's my opinion that I don't know of any other material, other than welded tuff, that is going to be safe for storing nuclear spent fuel or high-level nuclear waste. And there are going

to be other materials that come to Yucca Mountain, and the public, and even me or anybody at the work site, is not going to know what is in there. We have high-level waste that's top secret.

RM: You mean now?

GH: Yes. And it's ready to go to Yucca Mountain to be put in the ground. One is the navy fuel goes into a transportation cask and will not be opened.

RM: That's from the submarines and aircraft carriers and so forth. So they're behind the eight ball now, aren't they, because they don't have a place to put that.

GH: In 2032, all the navy spent fuel that's stored in Idaho has to be moved, by contract. So, the navy now is saying, "Where are we going to put it?" I mean, what's this blue ribbon committee going to do? It took us 20 years to get this tunnel at Yucca Mountain through from north to south. If we wait another 20 years, we're going to be in breach of contract again.

RM: Yes, and we're already in breach, right?

GH: Yes. In 1998, the Department of Energy was supposed to take control of all nuclear spent fuel. It's 12 years later, and I think we have settled six claims out of 106. We've already spent close to $500 million just on six settlement claims, and you've got another hundred to settle out there. That was just from 1998 to when they settled. They're going to sue again from that time to here so you're talking $5 billion. And if we store the waste on the sites, then we have another problem.

That problem is that under the Fifth Amendment of the Constitution, if government takes property, they have to pay just compensation. Okay, DOE is going to take the site where the spent fuel is stored at the reactor. And if they do, they're going to have to pay that power plant just compensation.

RM: Oh, I didn't know that.

GH: Government cannot take property without paying just compensation. Now, how much is an acre of land at a nuclear facility worth? Millions. I mean, in most states there's not a zoning parcel or a zoning avenue for nuclear power plants. Once it becomes a nuclear site it's more valuable because it can't be used for anything else but a nuclear power plant.

RM: Yes, and then the government has the problem of managing all of those sites, once they take them.

GH: Yes, 24/7. That means that you have to have inspectors, you have to have radiation people—Rad Safe—and you have to have security.

RM: The whole thing's goofy, isn't it? I mean it's just insane the way they've boxed themselves in. Do you have any more thoughts on the welded tuff and the whole storage issue?

GH: I had more experience with welded tuff than any of my other drillers because I worked at G Tunnel, and we had already ramped up to that welded tuff area. We developed a wire saw to try to cut the rock. The saw did very well, but we had problems keeping the wire cool enough in cutting it. What we did is we drilled a 50-inch hole here and a 50-inch hole here, then we put a base to where it sat there. Then the saw would just work right down. The wire saw was impregnated with diamonds to cut the rock. You can't cut this stuff with anything else—diamonds are it. And diamonds don't even like the stuff.

G Tunnel was very unique. It had approximately ten detonations in its history. One of them was called Red Hot. Red Hot was a weapon-related test. It was detonated in 1966 at G Tunnel. I wasn't there in 1966, but in the 1980s they wanted to go back into it.

After 20 years they wanted to see how hot she was. Red Hot did not contain, Red Hot blew out. And in those days we used sandbags for containment.

RM: Oh, rather than the plugs?

GH: Yes, and no grout. We went with the bypass, which is filled up with just thousands and thousands—millions—of sandbags. And the weight was supposed to hold the shot. Well, it didn't work very well, and she blew out.

RM: Did it blow the sand out?

GH: Yes.

RM: It must have been just like a giant shotgun.

GH: Yes. And they were working on another shot there, called Deep Well. It was right across from the main drift. It contaminated Deep Well so bad that we had to just bulkhead it up and forget it. They spent millions of dollars on it, and it was a total loss.

RM: Why did it blow? Did they miscalculate its power?

GH: No, but we were experimenting with closures and how to contain. We were trying to put as much weight in there as we could. It was a learning experience. I mean, everything we did out there was a learning experience to some degree. That's when we came up with a fantastic product. If it contaminated Deep Well, the main tunnel probably was contaminated too, right? Well, we came up with this miracle product called lead-based paint. We just painted right over the radiation, and it solved our problem. [Laughs]

RM: And did you do it in Deep Well, too?

GH: No, Deep Well was so hot, we just put a plug in there, 30-something feet of concrete, and we forgot about Deep Well.

RM: So if you get some radioactivity on your walls, you can just paint over it with lead paint?

GH: Depending upon how hot it is, it will contain it. If it's too hot, it will just slow it down. But lead-based paint was the miracle product. We cleaned the tunnel up in a matter of weeks, wherever the contamination was.

RM: Maybe that's a good thing for the average Joe citizen to know.

GH: No, because lead is not good for you. In our instance, we were not with it all the time. We were in and out, not consuming it. You wouldn't want to use a lead-based paint in your home; that's not a good thing.

What the public needs to understand is shielding. That's what you need to think about with radiation. The more shielding you have between the source and you, the better off you're going to be. If you can put a three-foot-thick area in between you and the source, it's going to take a while for that radiation to seep through so now you've got time to build another closure behind that. Shielding is the No. 1 thing you need to think about.

Even as workers, we were constantly given advice on the more you shield, the better off you're going to be, and the less radiation you're going to get. So in between me and the drill rig, if I put a piece of plywood up around the hole, then that's less radiation that I'm going to get. But in most cases, I wasn't getting any radiation. The stuff that was coming out was bad, what I was standing in might be bad, but as long as I took my stuff off after I went out of the hot area, I was perfectly fine.

One time—this was in G Tunnel, and I was working on this same shot, Red Hot—on a pair of Levi's you used to have buttons on the pockets. Well, I went out of the hot area, took everything off, and they were surveying my hands and feet. They just usually went over your clothes real fast. Anyway, I had some kind of contamination somewhere on my Levi's, and it pegged immediately. We started taking some alcohol-based stuff,

trying to get that off. In 30 minutes I said, “I’ve got to catch a bus.”

And the guy said, “You’re not leaving here until I get this contamination. You know, you’ve got two choices. You can sit here and let me work on it, or you can wear a paper suit home.” It turned out I must have, unconsciously, tried to get something out of my pockets. I reached through my coveralls and had my gloves on. After we found out exactly where it was, it was a matter of seconds, and we had it cleaned up, and I was on my way.

RM: So you could wear those clothes home?

GH: Oh, yes. As long as we can get it off. If you’re working in a hot area, you do not want to take hot showers, you want to take cold showers. You want to open those pores so you can get the radioactivity out. If you’ve got it in your pores, the coldness is going to open it up, and you’re going to get it out. A lot of miners and a lot of operators that worked in hot areas tried to get the water as cold as we could. That’s what you want to do, open the pores. And that’s exactly what they’re going to do when they take you to Berkeley if you get contaminated. They’ll put you in a suit and they’ll take you to Berkeley in a matter of an hour. And the first thing they’re going to do at Berkeley is put you in a cold shower and start from there.

RM: Did that happen to many guys?

GH: Oh, yes, it has happened. In the old days they didn’t take you completely out of the area. My dad sat right there on the Tipapah Highway and watched them shoot a shot at 16. Tipapah Highway is in Area 6. And Area 16 is to the north of there. He actually watched that shot. It picked that whole mountain up and set it right back down. But they didn’t take them completely out of there. They took them out of the area where they thought the shot would go. Now, when I worked there—and I started there in ’80—when

they detonated a shot everybody was taken out of the Test Site, clear back to Gate 200.

RM: Where was that?

GH: Mercury. [Laughs] That's as close as you're going to get. The only people on the other side of Gate 200 would be the scientific people and the big shots in DOE and DOD. They were in a controlled bunker at Area 6, the war room, where all the screens and cameras are directed toward the shot. So they were watching it as it was happening. The only other people out there were with Wackenhut Security. I tell you, if anybody was in jeopardy at all on a nuclear shot, it was Wackenhut.

RM: Did they ever suit up for those shots?

GH: I don't know. I couldn't get in there to see. They didn't say, and I didn't ask. The rule of thumb is—working for the government—if they didn't tell you the answer to a question you wanted to know, don't ask it. If they wanted you to know, they would have told you. Unless it's related to your job it's none of your business. Many people have had their badges pulled out of Indian Springs and Crystal out on 95 because they wore those badges outside the gates at Mercury. That was a no-no. We weren't allowed to wear our badges in public. When you left the Test Site, you put the badge under your shirt, or you took it off and put it in your lunchbox. Once you left the gate at Gate 100 at Mercury, you were supposed to take that badge and put it away. DOD and security people—even in places around where the buses were, bars and stuff—would walk in, and if they saw that badge out, they'd just jerk it off.

RM: Then did the person lose his job?

GH: Well, they could take your security clearance down a notch or two, they could give you time off, and if you had more violations they could fire you. It's a very serious offense. DOD and DOE took it very seriously.

I told you I spent seven days at Wyandot just getting a badge to go in, and that was a red badge. You get a security briefing. The first thing they tell you is, "Your clearance is your business. It's nobody else's business. You do not wear that badge outside of the Test Site, and you absolutely do not use that badge for identification purposes." If a cop stops you, do you give him the badge? No, that's unlawful. So the rule of thumb is that that badge is the property of the United States government, in your control for the time that you're there. And you treat that badge with the respect that they told you to.

RM: Otherwise, you were in trouble.

GH: Yes. Well, in the old days, when we were doing all these weapon tests, like from 1980 to '92 when I was out there, we had foreign agents running all around that place. It was one of the most top-security areas in the world. Those foreign entities wanted to know what we were doing out there. When I was out there, there was green for one security level and black for the other and red for the other, red being the lowest. If they saw a black badge, that was their target.

RM: So they might kidnap him or something.

GH: Well, they're going to start using him. Does he owe a lot of money? Does he need money? Does he drink a lot? Does he fool around on his wife? How many kids does he have? It was out there, and we knew it was out there. So when you left that gate, after you showed your badge to security and he let the bus go through, immediately it either went into your shirt or your lunchbox or your pocket.

RM: So you had to show a badge to get in and get out?

GH: Oh, absolutely.

RM: If you didn't have a badge to get out . . .

GH: You couldn't get out. Remember, we had all kinds of protesters in those days. So you didn't want a protester to be able to get in or out. There are all kinds of reasons. We wanted to make sure that the number of people that went in was the number of people that went out.

RM: When did your dad work out there? About what year did he start, and when did he finish up there?

GH: Oh, it was in the '70s. He quit in the upper '80s.

RM: Did he ever live at Mercury, or was he commuting all the time?

GH: He commuted all the time.

RM: And what years were you there?

GH: I started in 1980, and my career ended in 1998. In '92 there was a ban put on all nuclear testing, so there was probably a four- or five-year period that I wasn't working there. And then I went back to work for DOE again doing water testing. We had a pulling rig, and we went on to test post-shot holes to get samples of water to see what the radioactivity was. Every time you have an underground detonation, within three days there's a drill rig set up outside of the containment area. They'll drill down, and they'll try to get that drill hole to go right into ground zero.

RM: Underneath?

GH: No. It's called wip stocking. They want to go over here because they have it programmed to how deep they have to go, and then they'll start.

RM: And then they drill sideways, horizontally. And do they still go into the shot?

GH: Oh, yes, just like I did underground. I drilled up into the shot. That part of the test is seeing what the radioactivity is and what kind of radiation it is.

RM: And you did that kind of drilling, too?

GH: I worked on some of the rigs for a small period of time. I'm not a surface driller. My career is core drilling and underground drilling.

RM: Is there a difference in speed between a little core and a big one?

GH: Bigger holes always take longer because you have a problem getting a core out. The biggest core that I have done is 54 inches.

RM: Circumference? How do you handle a core that big?

GH: Well, first you drill an inch-and-a-half hole all the way to where you want to go. We wanted to go 50 feet. We now have a pilot hole. So I start drilling around. And if it breaks, fine. Then I take an expanded bolt and push in there, tighten up on it, and then pull the core out.

RM: Something with that kind of size, if it's rock, is heavy.

GH: Tuff is not too bad, but welded tuff is heavy. That's the stuff that I drilled for them. Now, the blue ribbon commission again—they're not looking at the record, because they would see that we've already done that. I drilled six, eight, ten, 12, up to 54 inches.

RM: Is that across or around?

GH: It's the diameter of the hole. We would put these in big plywood boxes with Styrofoam all the way around it and ship them to Albuquerque, New Mexico, to Sandia. Their job was to squeeze that rock. They wanted to see if they could get moisture out of it. By the amount of moisture they could tell if that rock ever had any water running through it. And we wanted to see. Every rock is going to have a little bit of moisture. I don't care what rock it is, if you squeeze it enough you're going to get some moisture.

The only water that we found in that mountain was from fractures from the surface. When you have a fracture up there the water will percolate from the rain or

snow, and there's very little of that, because, No. 1, the plants on top of the mountain were absorbing part of the water and the moisture. And evaporation was taking a big part of it. So there was very little water percolating.

What we were trying to find is water that runs through there like a stream, a fault that was carrying water. But we found there was no water ever running through welded tuff, not in that area. The fractures didn't carry a lot of water, and the faults were dry. That's one of the big things we had to find out. If it was carrying water 1,000 years ago, then it may carry water again. Then we would have a problem. It wouldn't be a good site. I agree with that. But we have found nothing to address that those faults or those fractures ever carried water from point A to point B. The only water that we've ever got is from fractures from the surface.

I don't care what kind of rock you put a repository in, even salt domes are going to have water that percolates. How do you think the salt got down there in the first place? Water. That's what makes some of these areas in salt not good candidates. If the salt's there, then there had to be water at one time. If water comes back, then we have a problem. Water's our biggest enemy. Yucca Mountain—those who are talking about that area, why aren't they talking about the 948 nuclear shots that we've had out there?

RM: That's what I want to know.

GH: And, you know, the water table is above or below where we just shot it off. I'll show you right here on this map where your problem's going to be. You may know this already. Right in here—Pahute Mesa. Over here is Beatty and over here is Amargosa. Well, we know that water already got across that once.

RM: Is that 20?

GH: Yes, 20 and 18, 19, those areas. Those were all big shots. My book tells me

they're from 100 to 3,200 kilotons. They don't say less, they say 100 to 3,200. Well, all these shots here were joint shots, UK-US, Canada-US, even a Russian-US. This is where we let them do most of their verification tests. But then you have the air force here and here, all around here. But that contaminated water has already left the site.

RM: Where is Yucca Mountain, off of which area on the Test Site? It's off of Area 25?

GH: Yes.

RM: Is that water moving fast?

GH: No, slowly. I'm trying to get the government to let us do some drilling off-site on public land for our own verification study.

RM: And Nye County had its own verification work, didn't it? Where were they drilling?

GH: All along Highway 95, both north and south. Mostly on the north side of 95. Some of them are in Area 25, but most of them are along areas here. I think it's 43 holes and probably 150 water zones. Not all the wells had just one water zone; the last one we drilled had six different water zones. It was a very good producer, a lot of water.

CHAPTER FIVE

RM: Now, you started in ’80, you said, at the Test Site?

GH: Give or take. I’m an old man. You can’t make me remember everything.

RM: So you were working for DOE, right?

GH: I worked for Reynolds Electric Engineering Company. REECo is what we called it.

RM: Okay. So you were working mainly on nuclear tests and things like that at first?

GH: My first job was at G Tunnel with Sandia. And my job there was experiments on the closures and containment. I did some independent oil work. I was there for three years, so most of my stuff was independent oil money and trying to bring about old oil wells that had quit.

RM: Oh, yes, for fracking, you mentioned.

GH: Yes, we would frac it, and then we would put dye in it, and then we would case that dye right and left from the hole. We fracked with everything—water, air, nitrogen, hydrogen. We tried everything.

RM: So Yucca Mountain came online in ’83. That’s when they sort of got going with it.

GH: I would say 1982.

RM: Okay, that’s when the law was passed, yes.

GH: Right after the law was passed, then we started doing stuff at G Tunnel.

RM: So you started working with Yucca Mountain problems early in ’83 or ’82 maybe?

GH: Last part of ’82, early ’83. We started ramping up to that welded tuff going out

there. You know, we drilled and blasted. And that wasn't working real well, so we did put a continuous miner up there.

RM: To do an incline?

GH: We did the incline, and then we went in there and drilled—cut out a big room.

RM: Oh, really, with a continuous miner?

GH: Yes. It wasn't the brightest idea we ever had. About every three hours we had to completely change every bit.

RM: Oh, my God. That must have cost a fortune.

GH: Oh, yes. It was costing—oh, I don't know—$50,000 a shift. That welded tuff just vibrated that machine all over the place.

RM: The machine was bouncing around and so forth?

GH: Yes. You're talking a 25-, 30-ton machine. The cutting bits were hitting that hard rock, and it was just vibrating that rig all over the place. And we had problems keeping the machinery up, because we'd break things. It's one thing breaking a bit, but the bit holder, if it broke off—we were constantly having somebody stand by with a welding machine to weld that stuff back together. I know when we finally finished, we had to send it back to Area 12 camp and let them have it for about three months.

RM: Just to repair it?

GH: Put it back together, yes—all those pieces.

RM: That's really interesting. So from '82 on, you were pretty much focusing on Yucca Mountain?

GH: I worked on just about every aspect concerning Yucca Mountain.

RM: Are there any other aspects that you haven't mentioned so far?

GH: Well, 15 shaft was another area. We had a drift there called the exploratory drift,

and we had holes drilled in the invert. “Invert” is what you could call the floor. And what they call the roof, we call it the “back.” And then we call the sides “left rib,” “right rib.”

RM: And that’s left and right as you’re facing the heading?

GH: Right. And we had these holes. I imagine they were four feet in diameter down, and the track ran right in between it. Then we had a robot up on the shaft. It would take the casks that held the spent fuel, pick them up off the truck, and bring them over in the shaft. It would go down the shaft 900 feet. Then it would land on the tracks. And then the computer would say, “Okay, we want you to take it to containment vessel No. 4.” It would go right down the track to No. 4, lift the lid off of the containment hole, place the fuel in the hole, close the door.

RM: Now, this was down a shaft. How deep was that shaft?

GH: Oh, 1,000 feet.

RM: Really? And this was all done automatically, right?

GH: Oh, yes. The robots took care of it. It’s still there.

RM: Where is that site? Can you say?

GH: Area 15.

RM: And what’s it called?

GH: Area 15 Shaft. Sedan Crater’s right in there somewhere.

RM: It’s not too far from Sedan, then?

GH: No, it’s to the northwest of it. 15 Shaft sits right in there somewhere. We had 15 Farm. We did experiments there on cows. We had a whole herd of dairy cows there. We were growing alfalfa, and we were using radioactive water to grow it and we fed the cows radioactive hay. We wanted to see—because cows have more stomachs than any other animal—how they digest the hay and see how much of the radioactivity came out.

We had one cow there that had a glass side, a glass implant so they could watch the digestion system. When they shut down Area 15 Farm, I think they gave the cattle to the University at Reno.

RM: What happened? Were the cows picking up a lot of radiation?

GH: None of my business. It wasn't related to my job, so—don't ask. I don't know.

RM: So you were working up there? And what were you doing?

GH: Yes, I was working right over in here, doing heater experiments, heater tests and so forth.

RM: Oh, you weren't working on the farm itself, but you were doing the heater tests.

GH: No, I passed it every day. But I know where all the pens are and everything are. You know where they are?

RM: No.

GH: Town of Pahrump.

RM: Really? The pens? I'll be darned.

GH: And the cow chutes and the horse trailers. They cleaned everything up. I was chairman of the town board at that time, and I knew that that stuff was going to be either sold or gotten rid of. They cleaned it all up so there was no radioactivity. So I did a little horse-trading, and I took five truckloads of agricultural gear out of there.

RM: And it's in a park in the town of Pahrump?

GH: The rodeo arena, right? We tore that arena down completely. Chief Gary Gilmore was the architect of that arena when we redid it. It was way too big so we cut it down and we made alleys along this way so we didn't have to put cows down here and up here and so forth. We had to transport them by horse trailer. All we have to do is open the gate over here and run them right down in between. In other words, we didn't have to do a lot

of work of putting cows in one place. And we could keep them all in the back. And all we had to do is run them into a chute, and they'd run right down here, right back where we wanted them.

Chief Gary Gilmore still works out at the Test Site. He works at Area 5 in the waste disposal area, where they dispose of low-level radiation. He was one of the architects of building that. But I was able to get all that equipment for zero dollars for Pahrump. The NTS Development Corporation at the time was in charge of doing all that stuff. They were hot at me: "How did you get that out the gate?"

I said, "Well, I got a piece of paper here that says it's mine."

Another thing I was able to get. You have a green fire truck that sits at Pahrump Fire Station donated by the Department of Energy. The fellow that helped me get that was Curtis Watson, who lives here in Pahrump. His wife is a DOE security supervisor. Curtis was able to give us that truck. Matter of fact, my people drove the truck out of the gate to Pahrump, and I didn't sign the papers until 6:00 that night. But I want to tell you, Curtis Watson is a very good friend of mine. He knows emergency services better than anybody I know. His wife is a very, very good person. They donated a whole lot of stuff to the museum that they collected, different certificates. Each one of these shots—you got a certificate if you worked on it.

RM: Do you want to talk about those? You've got a list of shots here.

GH: Red Hot was shot off in 1966. It was an important shot, for some reason. I don't know, and I don't care to know. But it was important to somebody.

RM: Was that the one that blew out?

GH: Yes, it blew out. They wanted to go back into this hole, into ground zero. I'm only thinking this is what their reasoning was, but they had a down hole from the mesa into

there. So they knew a little bit about the hole because they had put cameras in there. I watched a film on it because they wanted me to know what to expect. I sat in a projector room and watched this video on going down from Rainier Mesa into Red Hot. This blast wasn't glassed over like most of them are. The back came down, and big hunks of rock were in ground zero. They thought that most of the radiation had dispersed into the bypass. This was, I think, a cavity shot.

RM: A dome kind of thing.

GH: Yes, like a beehive. Anyway, they ran a drill over for me, and I set my drill rig up and we drilled in toward the ground zero. And when I got to ground zero, she was hot. When you're drilling in white tuff, and the color of the rock is white or grayish, and you go into a reddish color, and in between the reddish color and the white you have a black material, that's the radioactivity that turned that rock into a black material. It was extremely hot.

RM: You mean the radioactivity changes the color of the tuff?

GH: It can, yes. Anyway, the black stuff was extremely hot. So we went in there another five feet, and they said, "No, shut it off. Shut it down. It's just too hot to go in there anyplace." So all the radiation that leaked out into Deep Well and contaminated Deep Well so bad that they canceled the project and today that Red Hot is still too hot to touch, after 20 years. And that's what they wanted to know. I'd hate to see what it was in 1966—extremely hot.

Now, these are just some of the shots I worked on—not all of them, just some I could remember. In 1980, there was Mighty Iron, and that was at N Tunnel. In '82, there was Huron's Landing and Diamond Ace. They were shot off at the same time. Then Mini Jade in 1983; that was at N Tunnel. Then you had Tommy and Midnight Jepper, 1983.

Both of those shots were done at N Tunnel, and both of them were shot off at the same time. Midas Myth, 1984. And I don't know what this one is. But both those shots were done at the same time at T Tunnel. And then Misty Rain in 1985. That was an N Tunnel shot. Then Mill Yard and Diamond Beach in 1985, N Tunnel.

RM: And they went at the same time?

GH: Went at the same time. Mighty Oak in 1986—that was a T Tunnel shot. And this one, I think, is worth talking about. It's the only time we ever cratered the mesa. In all the years that we have detonated nuclear shots at Area 12, that is the first shot that ever made a crater at the top of a mountain.

RM: And why was that?

GH: I can only give you my thinking of why. It evidently was a pretty good shot, and there was a lot of heat. The steel sets and the steel material in the shot area were very hot—probably red, they call it—and the gases exploded again. I think we had three shots instead of one, and the mesa couldn't handle that. It must have had a lot of gases, because we lost all but, I think, three of Rose's Trailers.

RM: What are Rose's Trailers?

GH: It's probably wider than my home here.

RM: 25 feet.

GH: And it's probably 100 feet long. They line these trailers up inside this drift, and that's what gathers all of your information. All those trailers have silver and gold connections. They want the information at real time, so they didn't use copper and aluminum because of heat problems. And so, she—I call it a "she" for the temperament that she had—evidently blew two or three times.

RM: And what would cause that?

GH: Gases. The gases would contact the hot steel and ignite again and you would get another big explosion. Anyway, we destroyed all the Rose's Trailers. And those are a million bucks apiece.

RM: How many were in there?

GH: I think there were 36. They had already given the okay for the electricians to cut the cables at the mesa down hole. They had to cut the power to the shot. So they sent two or three Rad Safe and two electricians. They went up there, and one was cutting the cables when the explosions went off. So it cratered in, and the Rad Safe people and the electricians all, of course, went down with the cavity.

RM: The cavity formed. Was it a shaft? There was a shaft on top?

GH: No, there was just a drill hole with cables that went down it and was cemented up. The idea was to cut all the electricity and all the cables up there—cut them off so that there was no electricity going back into the shot area.

RM: Did they always do that?

GH: Always. Anyway, it killed one of the electricians and broke the leg on one of the female Rad Safers. That's the first time that we lost a life on account of something like that. We've lost lives in the mining or drilling or that kind of thing. But actually in a detonation, I think that was the first life that we had lost.

RM: And how big was the cavity, or the crater?

GH: I don't know. I never went back up there. It was pretty good size. Anyway, she cratered, just like they crater out there on the flats. And that's the first time in the history of Area 12, at Rainier Mesa, that we cratered a nuclear shot from a tunnel shot. It took us a little while to get T Tunnel back in shape.

But we did have another shot in '87, which was Mission Ghost. Middle Note was

at N Tunnel in 1987. Mission Ghost was in 1987; that was a T Tunnel shot. As you can see, it took us around a year to be able to do another shot at T Tunnel. Then, in 1988, there was Misty Echo. And on a lot of these shots, I went back in.

RM: You were going into recovery.

GH: On most all of these shots, one of my fellow drillers or I had to go back in within three or four days and do a hole into ground zero. Then we had Disco Elm. That was in 1989, at P Tunnel. Then we had Mineral Quarry and Ransberg, 1990. That was in N Tunnel. And those were shot off at the same time. We had Distant Zenith in 1991 at P Tunnel. I believe this was a cavity shot.

RM: You mean, it made a cavity, or it was shot in a cavity?

GH: We made the cavity. The cavity down here is probably 150 feet across at the bottom and 100 feet high. And the device was extended like this.

RM: And you didn't usually use that big a cavity, right? Or you just use a room or something?

GH: Yes, it's just a big hole underground. It looks like a beehive or one of these coke ovens up here in the mountains. Anyway, this was a very small shot and very radioactive.

RM: That was the peanut shot you talked about that was higher than hell in radioactivity?

GH: Yes. And I can only say, because I don't know. A lot of times they don't like you asking a bunch of questions.

RM: If you start asking questions, I imagine you'd lose your job, wouldn't you? [Laughs]

GH: Not only that, but then they get to question you. Yes, a lot of times, the more questions you ask, they want to know why you're asking the questions. Most people are

very curious. It's not that they would tell anybody or anything, but the rule of thumb in those days was if it didn't concern your job, don't ask it. The only thing I can theorize is that the fireball was very, very small and the heat and the gases didn't make enough fireball to burn off the radiation.

RM: And what was that shot called?

GH: Distant Zenith. It was in 1991 at P Tunnel. Most of the P Tunnel shots were early. I don't think P Tunnel started until 1988 or '89. Then you had Diamond Fortune in 1992 at P Tunnel. And we got Hunter's Trophy, which was in 1992 at N Tunnel. So total shots—and let me say, this is the figure they give you. There may be shots that they did that are so classified that they won't put it on paper. The total figure at the Test Site—all the shots in the U.S. and outside of the U.S.—was 1,054.

RM: But there may be others.

GH: Yes. We have shots that are still classified for different reasons. So you have full tests in the U.S.—1,030. And then you have U.S. and UK shots—24. That's 1,054 shots. Again, so that the readers will understand, that doesn't necessarily mean those were the only shots that were done. There were probably classified shots that were never, or will never be, made public. There was also one shot at the Central Nevada Test Area, which is up by Warm Springs and Hot Creek.

There was also one shot at Fallon, and they are calling these Plowshare programs. Plowshare programs were like Sedan Creator at the Test Site. They were done for reasons of, say, a canal. Instead of using millions of tons of TNT, they could do something like dig a canal in one or two shots and it would save lives and so forth—like, the Panama Canal was very costly in lives. The only thing is that the radioactive material was still too high. But we continued testing Plowshare programs, trying to get the radiation level

down. The central Nevada test and the Fallon test were both Plowshare programs, and they had to do with verifications of underground movement—volcanoes and earthquakes. They were trying to get a small device to give them a scientific reading on the seismograph so that they could better understand what went on underground. So those tests were not weapon-related.

And just because a test is weapon-related it doesn't mean that that was the only thing that they tested for. A lot of these shots had medical implications to them. I imagine people like Pfizer would put in detection equipment and so forth for medical reasons. The pharmaceutical companies and the medical companies would put tests in there to do verifications on radioactivity. If it says weapon related, that might have been the biggest component of the shot, but there were private companies that bought into the shot to do their experiments.

You could have airplane companies that would want to know how their aircraft would withstand a nuclear shot, so they would build a small aircraft and put it in ground zero. There were tank companies that might put something in there to see if the radiation at ground zero would penetrate the tank. They would have instruments inside the tanks. I know that we put a tractor-trailer truck in there to see how it would do, and I mentioned that we did a simulated submarine to see what that would do. We also put missiles at ground zero to see if they would detonate in the blast. So not everything was weapons related.

RM: It seems like quite a few that you worked on were simultaneous shots. I wonder what they were looking for.

GH: Again, in the years that I worked there, from '88 to '92, if they wanted you to know they would tell you. I didn't have a need to know why they did two at one time. All

I know is that it is not just pushing a button to set one of these things off. I mean, even today, if a president wants to shoot off a nuclear weapon, you can push the button all day long, and it won't go off. He has a code card. He has to give that code to the command center that is operational—has a nuclear device—and it takes one of his cabinet members to also give a code. There is a key system on top of that, and somebody else has a key. It takes two keys to set it off.

Another thing that the readers might be interested in: A lot of times the President of the United States was out of country when we were going to detonate. We would not detonate a nuclear device while the president was on foreign soil. We would postpone the shot until he was airborne and out of that country. Sweden and Finland were very bad about nuclear weapons. Doing a test then could put the president in danger. Every time we postponed a shot it costs millions and millions of dollars so we tried to make sure that he was in country.

RM: You had to monitor the weather, too, didn't you?

GH: Most of the time if the winds at the Test Site were over ten miles an hour, it was a no-go. I could walk out that door and head to work at 10:00 show-up time. That means that they are going to shoot the device before 10:00, and then you've got an hour or so before the all-clear. Most of the time we would get to the Mercury and be sitting there and sitting there. They would hold that thing until the very last minute, and if the winds were still there, they'd send us all home. They wouldn't open the area and have to reclear that area again. Everybody stops at Gate 200, and that gate is always secured during testing time. Security is on that gate 24/7 when we go to test. Even if we postponed the test, security will be at Gate 200 to make sure nobody goes into that area, because the next day we will probably have another 10:00 show-up.

CHAPTER SIX

RM: What were some of the other Yucca Mountain experiments or efforts that you were directly involved in?

GH: We did the first heated block experiment at G Tunnel in the early ’80s. I told you yesterday that when we drove this four-foot block and put the experiment inside the block and were moving that block back and forth with flat jacks, which are real thin metal; we’d pump air into the flat jacks and it would move the block to the right. Then we would take the left flat jack, hold it up, and move the block over.

RM: What was the idea of moving it?

GH: We’d put a radioisotope in the middle of the block and build it up with radioactive water. The object of the experiment was to get that radioactivity to move outside of the block.

RM: And how did moving the block make the radioactivity move?

GH: We were hoping that there were fractures in there, and it would leak out those fractures. But it didn’t happen. In that case, the experiment failed—it failed to do what we wanted it to do. On the other hand, it was a successful experiment because we knew something we didn’t know, that welded tuff is a very good candidate for storing nuclear material.

RM: And you were working on that in the early ’80s.

GH: Yes. Before they even started drilling.

RM: What other research were you involved in there?

GH: We did some bottle tests—like taking nitrogen or hydrogen or different gases and

actually blowing them up. They'd drill a hole, put a bottle of gas in there, and blow it up.

RM: What was that for?

GH: They would mine back in there, and you'd measure how wide and how high and how deep the cavity was. That gave you an indication of the gases—gas versus high explosives versus nuclear. For every ton of high explosives you get one kiloton. I don't know the figure, but if it was 2,000 pounds of high explosive versus one kiloton, and they did a one-kiloton device that made a hole four feet by four feet, then if they did a 20-kiloton they should have an even bigger cavity. So those tests were to verify the cavity and how big of a hole.

At the Test Site, before we even start drilling they know what the device is going to be. They'll put a fence around the area before we start drilling, and that's going to be pretty much where the cavity is going to be. They already know.

RM: They know what size. They can predict that.

GH: They've already surveyed this out, so they know where to put the fence, and, by God, they've been right on. Very, very close. You may have one or two of them fall in, but most of the time that cavity will be right where they said it would be.

RM: Within where they think it is. And that will make an indentation in the surface?

GH: Oh, sure. Anywhere up to 200 to 400 feet.

RM: Like a crater. [Whistles]

GH: Yes. Sedan is 450 feet deep and damn near two football fields across. I mean, it's a gigantic hole. I wish your readers could actually visualize that, and maybe I should try doing that. I'll try to get NNSA, National Nuclear Security Administration, to do a video of the Sedan Crater. We can have a night at the commissioner's chambers or somewhere and actually show the public Sedan Crater. It is fantastic. And this wasn't even a weapon-

related test! This was a Plowshare program—how to move material and make a canal.

RM: Maybe we could include a video with this oral history when it goes into the library.

GH: I think I can get NNSA to send somebody out there and do that video for me, and I'll tell them that we'll give them some credits on the movie and in the book.

RM: I'm not sure what Mike Voegele is doing over at the museum, but you should be on their video program over there, because you are a good speaker and you speak well.

GH: I am supposed to be there. They always want me to use this teleprompter thing and I'm not good at that. My name is not Obama. I don't do Teleprompters. [Laughs]

RM: How about if you talk about some of the things about Yucca Mountain that you have personally been involved with, the tuff and the drilling and all of that, and we put it in a video with this?

GH: That's what we are going to be doing. Joni Eastley's already done one. I did one, but it was the teleprompter thing, and it did not come out good. Now I am going to do one just ad-libbing.

RM: That's great, because you are good at ad-libbing, you can communicate with the average guy, and you're a county commissioner. We might go through this transcript and pick out key topics that you can speak with authority on, and get you in front of a good video camera and just let you start talking. Then we edit that down, and add that video to your book.

GH: That would be my pleasure.

RM: I think we should do that. I've talked to Jean Younker and Mike Voegele, and they see this, of course, from a different perspective.

GH: I'll tell you, that Mike Voegele and I go back a long ways, to 1981, '82. If there is

anybody that I know that has been with the program the longest, it is Dr. Voegele. He has been from point A to point Z in the program. But he's a scientist and I'm not.

RM: And you were down there with the nuts and bolts.

GH: Dr. Voegele was right along with me sometimes. [Laughs]

RM: But you were running those machines and motors and you had all that experience with the Test Site.

GH: I taught him a few things. [Laughs] Well, let's talk about Yucca Mountain, because it is a very important subject to me. When we started the north tunnel, the entrance was all done by drill and blast. And that's a big hole.

RM: That is up on the mountain, right?

GH: Yes, going into Yucca Mountain, the north portal. We had to do that for one reason—the TBM could not get in because it had no way to grip—there wasn't space up there. So we had to get a tunnel in there big enough to slide the TBM in so that the grippers could grip on the wall. Then we got to thinking that we had to go even further, because we were afraid if it gripped just in the entrance, and the grippers went there, we would cause the rock to fall because we'd been doing drill and blasts to get it in there, and the rock was now fractured.

So we went in there probably almost 100 feet, and then the TBM was able to grip on it. In fact, if you look at the tunnel on the inside you'll see concrete walls on the side because the tunnel now is even bigger than the TBM with the grippers. We had to do some concrete there so the grippers could grab on and start to tunnel. And the tunnel is five miles long. We were doing usually around 100 feet a shift, so that's 300 feet a day.

RM: So you were working three shifts.

GH: Three shifts, and most of the time seven days a week.

RM: And were you working on that?

GH: A lot of times I would be. If I wasn't drilling I was on a motor, a train; I would be taking rail in, wire.

RM: So you were directly involved in that.

GH: Yes. The first scientific program that Nye County did was a weather station at the end of the TBM that gave us the temperature of the tunnel at the TBM. It also gave us the humidity, the barometric pressure, the moisture rate, and so forth. I think we even had some dust monitoring equipment there.

We were the first county to actually do a project at Yucca Mountain independent of DOE. DOE didn't have a key to the locks on that thing; it was all done by us. We weren't like Clark County, taking money for scientific purposes and using it to fight the project. We were actually doing the work that needed to be done.

RM: The DOE people I've interviewed say Nye County did damn good work.

GH: DOE told me they used a lot of our drilling program data in the licensing application.

RM: You had so much firsthand experience with DOE at the mountain.

GH: You are right, and it infuriates me when the state of Nevada and these non-nuclear people open their mouths, because they don't know what they are talking about.

RM: They don't know shit from Shinola.

GH: A lot of them have, unless it has been pushed in their faces, never even seen a piece of welded tuff. Anyway, I was the foreman on graveyard at Alcove 5. I had three drillers—five days a week, eight-hour shifts—drilling holes for that project.

Well, let's get back to Yucca Mountain. Maybe I should give you a picture of when we busted through it on the south end. I've got one down at the repository office. I

can have a copy of it made for you. We had to wait. We were 30 feet from busting through at the south end. We were coming out, and an historical thing happened. We had to wait two weeks.

The bust-out date was due during the first week. Vice President Gore was scheduled to be there when we busted through. He didn't want to be there during Earth Day, so we postponed it. You don't know, and you don't want to know, how much that cost. DOE would have three shifts of miners, operating engineers, and technical people sitting on their asses for two weeks, waiting for him so we could bust through. They didn't want to lay the guys off and then come back and not be able get them to come back because they had got jobs other places. And you can't just get off a list. If a driller took a gravy job in Las Vegas, then you wouldn't get that driller back. DOE didn't want to take that chance so they paid them. It's our fault because we can't get Gore here and we can't tell the Vice President of United States what to do. That cost the taxpayers a lot of money.

Then we started scientific programs like Busted Butte. Busted Butte is on the very southeast end of Yucca Mountain, and it's very important for a couple of reasons. When we tunneled in there, we were wanting to do an experiment with radiation that we could not do in Yucca Mountain. Because radiation wasn't allowed into Yucca Mountain; we didn't want to contaminate anything.

RM: Where was Busted Butte?

GH: Busted Butte is about four miles southeast of the mountain; the very end of Yucca Mountain. I drilled some holes at the top and drilled some holes at the bottom, and we injected radioisotopes and let it percolate down. We were right in the area where there is a layer of zeolite that lies underneath the mountain, and we wanted to see how long it

would take that water to percolate down and see if the zeolite would absorb it. This is a mistake that I think DOE made—when you get down to the mountain you have approximately 1,000 feet to where the experimental tunnel is.

RM: You mean 1,000 feet deep?

GH: Let's say 1,000 feet to where the repository is located, and then you have another 1,000 feet and you got another layer of zeolite. Zeolite is a mineral. It's very good. It is used in swimming pool filters and all kinds of filters. But one of the main things good about zeolite is it consumes hard metals—copper, iron, and that kind of thing. Another thing it does is absorbs radionuclides. So down here you've got this big zone of zeolite. Then, of course, you get into your water material.

RM: Below that.

GH: Yes. Well, DOE used all these factors in their calculations except the zeolite. I think that is a mistake, because the zeolite is very important. What they didn't want is the perception that something could get into the zeolite. Because if it got into the zeolite, it could get in the water. We think that this is another added safety area, and we thought that they should have at least brought it up as a last-ditch effort to keep the radiation from getting into the water. We don't think that the radiation is going to get 1,000 feet to here.

RM: From where the radiation is it would have to go 1,000 feet to get into the zeolite in the mountain.

GH: This is where your waste would be. Then you have another 1,000 feet to the zeolite. I can't remember how thick this is—it's very thick. And then you may hit water, this may be a water-type rock. But there is water down below.

RM: Yes. And how far below the surface of the mountain is the storage area, would you say?

GH: It's 1,000 feet. So the only water you're getting is in these fractures coming down. When you get to the crest of the mountain, the water is either running off or what water is still there, the plants are absorbing. And after the clouds go away, the rest of it is being evaporated, so I don't see a lot of water going down these fractures.

And then how in the hell are they going to rust through the containers, or whatever? And then, to get out of them and go another 1,000 feet—then the zeolite's going to pick that up. I just thought that DOE should have made the case that there is another layer of protection there, which they didn't.

RM: How thick is that zeolite layer? Do you remember?

GH: I don't know.

RM: Is zeolite a volcanic?

GH: Yes. You could take a rock as big as this table and pick it up. It is light. You have a lot of it out here in Amargosa Valley. American Zeolite is right here. Their plant is in Ash Meadows. Their mining operation is just over the California line. That whole area around the entrance to the park there is zeolite. You'll see a green spot there, and that's what that is—zeolite.

RM: So you were involved in the big tunnel in Yucca Mountain.

GH: Yes, they needed to keep us drillers for those weeks because they didn't want to have us laid off, and then they couldn't find the drillers or drill helpers. So they used us outside with forklifts or loaders, and most of the time I just operated trains.

RM: How long were you involved in that tunneling operation?

GH: Until they had a drill project. The biggest one we had was Alcove 5. Alcove 5 is a heater experiment like we did at G Tunnel and at 15 shaft, except bigger. Much bigger. It was probably 50 feet long by 14 wide, probably ten feet high, 8,000 feet of hole. We put

heaters all over the place.

RM: In the holes?

GH: Yes. It was the first time. They wanted us to use air, and we told them it was going to be very expensive to drill with air. We talked them into measuring our water source tubs, so the pump would take the water from there and pump it into the hole. We would pick the water up, put it back in the tank at the end of the shift, and measure it again. Then we would know how much water we were losing or how much we would gain.

Water is a problem. What if we hit water? We wouldn't know it if we were using water. Up until this time we never used water for drilling, we used air. And air's very expensive because diamonds don't like air; it doesn't cool the bit. It's slower and time consuming. So they bought on to this idea of ours that we could drill with water and measure and see how much we got back. We told them that they could heat the rock up a little bit, and if there was water in the rock the water would come back to the drift—the path of least resistance. If you heat the drift, the water is going to go in this little trench and the water will come out the other end of the hole. We'll take that and pump it into the tank and measure it, and we'll see what we got back.

We got 99 percent of our water back and what was left in the rock evaporated; it just disintegrated. We heated this rock up to, I don't know, 300 degrees F or whatever—as hot as we could get it. We sat there, I think, for three years and heated that constantly. We heated and we heated and we heated. I don't even know if they told me how hot the rock was but it was enough that if you were in there, you couldn't breathe. You would die. The heat would have used up the oxygen that was in there. In a matter of a few minutes you would be dead.

We know that the water did come out of the rock, which is what we told them it would do. I think the temperature of the rock was around 88 degrees—maybe 80 degrees—when we started. Last time I looked at it, it was 93 degrees; it still hasn't cooled down to its original temperature. That's why this rock is good. It will hold the heat of radioactivity. It's been ten years since we did that experiment, and it still has not cooled down to its original temperature.

RM: How far in was Alcove 5?

GH: A mile and a half.

RM: And it was its own tunnel?

GH: It was a drift off to the left. Just as you went in about 50 feet there was another heater experiment that they had done earlier. It was in the face and they had heaters, and they were heating rock up. But it was exposed to air on this side. The tunnel that we did was bulkheaded. There was no air getting in there; it was sealed completely off. That was the whole thing. We wanted to keep that heat in there and keep building it up to see if that rock would store the heat. The rock did exactly what we thought it would do. And now it's doing exactly what we wanted it to do. It is still holding heat, even though now there is no bulkhead; the air is still getting to it. Normal rock would cool down very fast. This rock is probably eight degrees hotter than it was when originally we started.

RM: How hot did it get?

GH: I don't know. I drill the holes, and then I go to another project and I don't see these guys every day.

RM: What was another Yucca Mountain project that you were on?

GH: I know we were drilling a hole from surface. I think it was WT24. On the surface, sometimes you have cap rock. Sometimes it's volcanic, and sometimes it's limestone—

hardly ever sandstone. And it's very hard. We were drilling surface stuff, and we were using a down-hole hammer bit, which is a flat bit, a conventional bit, but it vibrates, and the bit goes around. So it's breaking that rock up and drilling at the same time. What I was seeing coming out of there at 100-some feet was sand. I told them, "I think you need to pull that hammer bit, because I think you guys are in sand."

Well, the superintendent said, "Nah, we're going to go to 200 feet." They hung the bit up in the hole. And they put on so much strain trying to get that bit to break loose, the driller let go of it and it twisted around. (To get the hammer off of the bit you have to turn it to the left and lift up, and the hammer comes off. Now you have nothing but a conventional bit.) They went back to that locking mechanism, and he let off the brakes. Boom! It came loose, and they thought they had the bit. Well, when they pulled it out, all they had left was the hammer. They left the bit down there, because it came undone. They went too far and came up, and when they took off the brakes she went up. So that was six weeks, getting that bit out of the hole. We always get it out one way or another.

So we got down around 2,000 feet. And usually the rule of thumb is that every 100, 200, feet we take a ten-foot core sample, just to see what the rock looks like. They went in there and hung the core bit in the hole. Now, that's normal. Things like that happen.

So the next thing I knew I was down in Area 25 at the drill yard getting some pipe ready to send up to the hill, and the inspector said, "We're hung up, up there."

And I said, "Well, what do you got in the hole?"

He said, "I got 101-millimeter pipe in the hole."

And I said, "Shoot, that's easy."

He said, "We're calling Tiger to come shoot the pipe into it."

And I said, “No, I wouldn’t do that. I’d go down here in the yard and take up a string of 134 millimeter and put a casing shoe on the end of it, and I’d drill around the core barrel and she’ll come right undone.”

He said, “Damn, that’s a good idea. How much of that you got?”

I said, “Well, shoot, I got enough to go down 2,000 feet.” So he ran back up there, but Tiger had already shot it in two. That was another six weeks of fishing. We had to order about 2,000 feet of washover pipe out of Arizona.

RM: So you went out beyond the hole and had to put down bigger pipe?

GH: The rule of thumb is, say your core barrel is a four-inch or three-inch hole, and that was with 101-millimeter pipe. My thinking was to get 134-millimeter pipe with a casing shoe on it.

RM: What is a casing shoe?

GH: A casing is a diamond shoe that fits on a piece of pipe so that you can be bigger than your hole, so that, if you are in a bad area, you can push casing in there. That 134 would have been drilling right around that core barrel and not touching it. All they had to do was drill a foot, and this thing would have come undone because it would have broken up this material that was holding it. It would come out. The 134 is this big and this is the 101, so they could have gone right over their 101, down to the bottom of their hole, drilled a foot, pulled out, put the 101 back on, turned it two times, and picked up. It would come loose.

In this case what they did is they shot out the pipe above the core barrel. That way they put down a device that is bigger than the pipe, and it just digs into the pipe to pull it out. If you can’t get it out with the 101 pipe and picking up on it, what makes you think you can shoot pipe in two and trying to pick up? You still haven’t done anything. They

were thinking that the concussion from the blast would be enough to jar this piece of pipe in two, and then all they had to do was go over it with an overshot and pick up on it, and it would be out. Well, they were wrong. And that's what this inspector told them: "If you did what Gary said, we'd have been out of here six weeks ago."

But that's drilling. You cannot see at 2,000 feet so you're running through all of these things that you think are going to work. My thinking has always been that my last resort is shooting the pipe, because if I can't pick up on it, then shooting a pipe in two and going down in there with an overshot to try and pick up on it isn't going to work, either. If you were going to shoot the pipe you would have to shoot it right close to where the core barrel was, and then you would blow the core barrel all to pieces. Putting a shot down there right beside the pipe, where it won't blow the pipe up—that might be something that I would do. Shooting the pipe in two would be my last resort.

What they do is they have a piece of pipe, and they run what they call shotguns. They know exactly where they want to shoot, and they put their explosive device in this shotgun. There might be 15 shotgun shells. So they send that down right at the footage that they want to shoot, usually at a joint, and then they will shoot that off. And by that time there's nothing left. Soon as you pick up on it, it is going to bust loose.

RM: What other kinds of projects were you involved in on Yucca Mountain?

GH: We had niches along the five-mile tunnel that we would have to do drilling in and do scientific holes for different users. We call them "users." Like Sandia, Lawrence Livermore—Albuquerque, Berkeley—all of those national labs that had anything to do. They wanted to run an experiment, and we would do the scientific holes for them. Usually they were very particular on the size of the hole and where the hole ended. We didn't wear and tear; we were slow sometimes to make sure the user got exactly what

they wanted, because we're doing a scientific hole. If we say it's 100 feet, it's 100 feet. Because they're saying if it's 100 feet and an inch one way or the other, there might be a fracture there that they didn't know anything about. Most of the time we will send a video camera in there—they don't want a hole that is going down.

RM: That is dipping. They want it straight.

GH: They want it just enough to where if there's any water, it will run out. We did not intersect any water zones in Yucca Mountain. None. If anybody had seen water it would have been me.

RM: Yes, because you were the one doing the drilling.

GH: Like I say, the only drift that had water injected in it was Alcove 5. All the other scientific holes that we did were drilled by air. When you drill by air in this stuff you have to use masks. I wore a mask all the time.

RM: Yes, because you are getting silica out of there, aren't you?

GH: That's another reason we did not like air. We had to suit up with this mask, and it is bad on your lungs.

RM: You were drilling like the old-time miners in Tonopah, that all got silicosis in the mines up there. They were drilling without water in all those early years.

GH: Well, the reason there's a fan line running down the center or to the right of the tunnel is they're sucking bad air out. The more air you suck out that pipe, the more the tunnel will intake. If you take a 36-inch line, and you make it 46, you're pulling more air out of where you're mining. And if you're pulling all that air out, the tunnel will take exactly that much back in.

RM: Clean air, that you are blowing in.

GH: And these tunnels usually stay under 79 degrees, most of the time 76. So it's very

cool, and it is very easy to work with, unless you get into an area where your fan line isn't working. Then she will heat up. Out at ABC I have seen it at 110. I had helpers that were jumping in the water tank to cool down. And we'd have to shut down because of that and run a fan line so we could get that hot air out.

RM: What kind of experiments were the labs, like Sandia and Lawrence Livermore, doing in all of these tunnel projects? Were you aware?

GH: Most of the time we would drill the hole, and Sandia would take the core back to Albuquerque. They have a system of squeezing rock to get moisture out of the rock. As far as I know, Sandia or any of the other users were not very successful in getting any water out of it at all.

RM: So it was mainly water-type projects they were doing?

GH: Water, and they would drill into fractures or a fault that they knew was coming down. They'd drill in there to see if it was carrying water or if there was any mineralization. But most of our experiments had to do with heating the rock and seeing if it was going to contain the heat. And the rock did exactly what we thought it would do.

RM: And you did this for how long?

GH: I was working out there on the rigs on the Test Site and then got laid off, and then I went to Yucca Mountain. I retired in 1998.

RM: In ’98. Were those Nye County rigs that you were working on?

GH: Out there? No, they were all DOE. The rigs I worked on out here are rigs where we contracted to do the work. And I just consulted.

RM: You mean for Nye County, not on the Test Site?

GH: Quite a few of our holes are on the Test Site. That’s the reason why some of my people are badged, so that they can get on there to do the work. We’ve been doing independent science programs.

RM: So that was Nye County’s independent science.

GH: For all the work I did at Yucca Mountain, I was working for Peter Kiewit. Kiewit was the general contractor for making the tunnel. Morrison-Knudsen was there; they’re a big mining company. They did all the operational work.

RM: And when did you run for the Pahrump Town Board?

GH: I was elected in ’96.

RM: What made you decide that you wanted to become involved in community service?

GH: I don’t know why anybody wants to do the job that I’m doing now and have done in the past. Sometimes it’s not very rewarding. A lot of times 50 percent are going to love you, and 50 percent are going to hate you. And on the next issue, the ones that hate you, love you, and the ones that love you are going to hate you. A lot of people think that

there's a lot of power and a big to-do about being a county commissioner. If you're getting into it for that reason, you're doing it for the wrong reason.

It's a thankless job, Bob. It really is. I mean, I work for 25 cents an hour—$23,000 a year. I work seven days a week. I've had calls at 11:30 at night. I have calls Sunday and Saturday. This week I have not been feeling well so I took some time off, but usually I would be doing some kind of community service on Saturday and Sunday, attending some kind of benefit or something. And that's part of the job. You know if it's No To Abuse or Salvation Army or Senior Center or any of these other nonprofits—if you go to one you've got to go to them all, or try to go to them all. And if they ask me, I go.

RM: How long were you on the town board?

GH: Four years.

RM: It's a four-year term?

GH: Yes. My term was up in 2000, and I ran for the Nevada State Assembly in 2000 against your old buddy, Roy Neighbors—a five-time incumbent. I lost by 1,200 votes.

RM: In that huge district.

GH: Yes, it was Nye, Lincoln, Esmeralda, and Mineral counties. I stayed even with him everywhere except in Pahrump; I beat him in Pahrump. But he beat me big time in Mineral County. Well, I had an R in front of my name, and he had a D in front of his.

RM: And they're Democrats.

GH: With the ammo depot being a union company, they all went with Roy. Not to say anything about Roy—Roy Neighbors was very, very good to Nye County. He was a very good friend of mine, and he took it a little bit hard that I ran against him. I think he's forgiven me for that.

RM: Now, when did you run for commissioner first?

GH: The first time I ran for commissioner was in 1998. I ran against Cameron McRae. I lost that race by 50 or 60 votes.

RM: And then you ran for the state legislature after that.

GH: Yes. In 2000, I ran for the state legislature.

RM: And when did you run for commissioner again?

GH: I went to a county commissioners' meeting in 2004, I guess. One of the commissioners said that I gave him a credit card to do whatever he wanted. I said, "No, I did not give you a credit card to do whatever you want, and I guarantee my name will be on the ballot. I will be the first one to put my name on the ballot." Well I did, and in the primary I beat him three to one.

RM: How has your Yucca Mountain background helped you as a commissioner?

GH: Candice Trummell was the chairman of the board when I took office, and she immediately gave me my liaison assignments that January. I have served as liaison commissioner for Yucca Mountain since I took office. I think I'm on my sixth year. That's unheard of. Most of the time it's one or two years that a commissioner will serve, and another commissioner will be wanted or a commissioner will leave and another commissioner will come in. I have taken this job for six years and held it for six years under a whole bunch of chairmen. Every year there is a new chairman.

RM: And what do your liaison efforts involve?

GH: I work with NWRPO on a daily basis to make sure that what they say is consistent with what the commissioners want them to say. NWRPO is Nye County Nuclear Waste Repository Project Office, under Darrell Lacy. It is not a big job today, because Darrell walks a chalk line. I have a little problem with Cash Jaszczak every once in a while, but

Cash has been really good for this program, along with Dr. Voegele. And Robert Gamble has been a blessing. He's been our on-site representative at the DOE headquarters. Robert has done a terrific job. Then I have Levi Kryder. He's my ace in the hole when it comes to the scientific program. Levi makes sure that I get all the information from a hole. And if he has a problem with a hole—I'm going to tell you—he has plenty of people that can give him information, but he always asks my advice on drilling. He's been very good about coming to me and saying, "Hey, Commissioner, we got a problem here. It may be a drilling problem."

I'll give him the best advice I can, and if I don't know, I just say, "Levi, I don't know." Trust your driller; that's all I can say.

RM: This is on the Nye County scientific drilling program.

GH: We're doing some drilling now. We're drilling some monitoring holes for the water map that we got from DOE.

RM: What have been the challenges, as a commissioner now, interfacing with Yucca Mountain?

GH: Well, I used to try to respond to everything that the state of Nevada and Harry Reid said, but they shoveled on so many of them I can't keep up with all the half-truths and mistruths and sometimes outright lies. I just can't keep up with it. I just found out, No. 1, they don't care. I can't get this information out to all of the public. But I can tell you this, in the last few years I think that Clark County has really changed their mind on whether Yucca Mountain is good or not. The first ones to actually desert the ship were Reno. They did a survey, "Should we negotiate with DOE on Yucca Mountain?" And I think it was 70/30 said yes, we should.

RM: In Reno? Wow!

GH: Yes, Washoe County. And then all of a sudden here come these groups, nuclear power this or that, in favor of Yucca Mountain. There are several groups in Washoe County right now. I get their newsletters every month. I think people are saying, "Maybe this is not the truth that we've been hearing." Because all of these nuclear people that I live around and in Washoe County are disputing all these "facts" that the state puts out, and they work in the nuclear industry, and they're with the Nuclear Waste Alliance, or whatever the group is called. And some of these people are nuclear scientists. They've worked in the nuclear field, and they are telling their citizens, "This ain't true. This is fabrication. They're out in left field drawing to aliens or whatever they're talking to, because that's not true." And that's what's helped the program.

My biggest thing is that President Obama has a problem, and it's Harry Reid. President Obama wants to get his agenda through the Senate, and he knows that if Harry Reid is mad he's not going to get it through the Senate. That's the reason he was so strong about opposing Yucca Mountain. I think that if Harry does get elected—and I don't know if he will or not; it's up to the voters of this state—Dick Durbin from Illinois will come after the speakership. Illinois has at least six nuclear power plants. Dick Durbin has been very outspoken about Yucca Mountain.

RM: He has? Pro?

GH: Yes. He wants the waste out of his state. He wants it in Yucca Mountain, where he thinks it's safe. And I think that Dick Durbin is going to say, "Hey, the buck stops here. The NRC has jurisdiction over that licensing once it's put in there. Once we put it in there, the law says the only person who can pull it is the United States Congress." I think he will say, "Do you want to change this? If you do, let me know and I'll put it to a floor vote." If it goes to a floor vote, it isn't going to be on Harry Reid's side.

That's the reason, Bob, that Harry hasn't brought it in front of the United States Senate. He knows he can't win there. The only way he can win is to starve the program to death and pull the license. Because the Nuclear Waste Policy Act says that Yucca Mountain is the only site to be constructed. In that case, the only way Reid can take the program out of the picture is to pull the license. He doesn't have that authority, and neither does the DOE or the president. To pull that license, he has to go back to the United States Congress.

RM: That's right. But what if, by hook or crook, they do it? What do you see as the future of the program then?

GH: I think it'll be really bad problems in the future. I think that the ratepayers in the East and the South and the Midwest are going to come unglued. They are going to want their money back. I think they will petition to stop the mill rate for the nuclear waste fund. I think there will be lawsuits from here to the moon, including half a dozen from Hanford and another ten or 20 from Idaho. That's not talking about Savannah River and Oak Ridge and some of those plants in Illinois and Ohio that are still packaging high-level nuclear waste and have no place to put it. I think it's a big problem.

RM: And then eventually they will come back to Yucca Mountain. That is what I think. Where else are they going to find welded tuff?

GH: Guarantee—all roads lead right back to Yucca Mountain. No matter what a blue ribbon commission comes up with, they know doggone well that taking control of the waste at the plant sites is going to be very expensive. I mean, we're already trillions and trillions of dollars in debt, and we are going to get more in debt by having to lease or buy this land. And we probably can't afford to buy it, so we will be leasing it. Then we have to put all those people there to take care of it. How can you limit government when you

keep making more government? What we need to do is bring this waste to Yucca Mountain, start recycling, putting back in the mountain what we can't use, and selling the recycled fuel back to the power plant.

But the future fuel cycle for nuclear power plants will be thorium. Thorium is another radioactive material like uranium, but you can't get to plutonium with thorium so you take the bomb thing completely out of the picture. The only reason you're recycling is to get bomb-grade material, plutonium. If you can't get it, you can't make a bomb. If we start using thorium as a fuel cycle, we might have to switch the spent fuel rods more often, but that's part of the deal. The thorium just goes into the mountain, and it decays very fast. The half-life is much shorter than uranium's. There are all kinds of good things about thorium. We have a lot of it in this country. We could actually give it to these Third World companies and let them burn it up and make power, but they can't get the bomb-grade material.

RM: Is there thorium in Nye County as far as you know?

GH: I don't know. It's not a mineral that we have been looking for, but I know Idaho's got tremendous deposits. We don't even look for uranium anymore. I did a little talk—I think it was in Florida—at a dry cask seminar, and I told them then, "I think that thorium will be the next fuel cycle so you need to start looking at thorium." And I stated the reasons why I thought it would be a good fuel cycle.

Well, this guy came up to me after my little talk, and he said, "You know, we've been working on this for quite some time, trying to keep it quiet, and you get up and in five minutes blow it out of the saddle."

I said, "Well, I'm sorry."

And he said, "That's all right. There are six companies right now looking at trying

to produce a thorium fuel cycle."

RM: I always figured that the spent fuel would never stay in Yucca Mountain because there is too much energy in it. It'll be recycled, like you say.

GH: Let me give you a for-instance. If we wanted to, we could just leave the spent fuel in there and let it generate heat. Have a water line going right down the middle and turn that water into steam, because it's going to get hot. Make the steam turn a turbine outside, make electricity, and it could go right back into the mountain again. Yucca Mountain could be the biggest power plant in the world.

But there's risk to everything. What if the water line broke and you got radioactivity? Well, that's true; it could happen. I'm not saying that that's the right way to do this, but if the public really wants to know, nothing is for nothing.

RM: That's right. There's no free energy.

GH: That's what they say about renewable out here—the sun is free and this is going to make our electric bills cheaper. Well, I want to tell them it's wrong. They're going to be selling that power to NV Power (Nevada Power) for 17 to 25 cents a kilowatt-hour. That is what the power users in California are going to be paying for it. What do you think it is going to cost you, the ratepayer? Don't tell me that it's cheap or free. Because it's not.

Going back to thorium again, you don't have to reinvent the wheel with thorium. You do the same thing with thorium as you did with uranium. You charge it the same way—make it in little pellets the same way—and you put it in the same container.

RM: Will it work in the existing reactors, or do they need to build new reactors for it?

GH: I think it will burn. Can we use thorium in the same fuel cycle with uranium? I don't know. We need to get it out of the classroom and actually put it into a small power

plant and see if thorium is going to work right beside a spent fuel such as uranium. I think it will.

RM: Maybe that's a project for Nye County to try and get funding for. Build that research facility here in Nye County.

GH: I don't think that Senator Reid is going to help us on anything that is nuclear.

RM: No, he can't do it. Nothing is going to happen as long as Reid's in there.

GH: I want to tell you right now, I don't hate Harry Reid. In the old days, Senator Reid and I got along very well, politician to politician. I would say we disagreed on 98 percent of the issues, but we were able to talk, and we were able to get along. But he has let Yucca Mountain get in the way of the friendship that we did have. He won't talk to me at all anymore.

RM: He won't talk to me, either.

GH: When I ask to see him now, I get a staff member. He hasn't talked to me since Commissioner Eastley and I were sitting in his office in D.C. The last two or three times I've made appointments to see him, I've ended up with a staffer. But I want to tell you, years ago he was very nice gentleman. I was able to get along with him. We could at least talk about the issues without being hostile to each other. I just want to say that I'm sorry to see that one little issue has caused him to dislike me that much.

RM: Yes. Getting back to the shift in opinion in Nevada, rural Nevada has always been in favor of Yucca Mountain, haven't they?

GH: Well, they have all wanted the money. [Laughs] Let's put it that a way. You know, Inyo County would have never been—DOE did not want them even in the group of AULGs (affected unit of local government). Dick Carver and, I think, Cameron McRae . . . Nye County got along with Inyo County in those days, and I think that is why

Nye County fought to let them be an AULG. The downwater problem is not going to get to Death Valley or Independence or anyplace in Inyo County.

But now you've got Mineral County. Mineral County has been so-so for it with Yucca Mountain. They haven't come out backing Yucca Mountain. Esmeralda is pretty well pro–Yucca Mountain. Lincoln County is pro–Yucca Mountain. Ely doesn't say much. Lander—I don't know where they are at on it, but they want the money. Churchill—I think they are on the pivoting point. But I think they're all asking the same question: "What could we get if we negotiate?" That is what they want to know.

I had a discussion with some of the industry people and NEI, and they said, "We, as the industry, are willing to discuss raising the mill rate in order to give Nevada $500 million to $700 million a year." And that just is industry talking about raising the mill rate to generate enough money to give us money, and that's not counting the purse that we could get. What about UNLV being the primary nuclear college of the world? It could happen. With Yucca Mountain, and with all the scientific stuff that is going on there, UNLV would be the primary nuclear college of the world. Everybody would be fighting to come here to study nuclear energy or nuclear engineering or nuclear physics—anything to do with nuclear.

We had discussions with DOE about putting a desalination plant in the Pacific Ocean. Let's do the plant there and ship the water to Las Vegas after you desalinate it. That could save Clark County $3 billion in trying to get water. Those things are on the drawing board for Nevada to talk about. We could get four lanes all the way to Reno, or at least to Beatty—we're trying to get a north and south route that's safer, and this would be. If we use the Mina route we could have a north-south railroad all the way from Las Vegas to Reno. Look at all those tractor-trailer trucks that could be taken off of 95. That's

all on the drawing board; it's all being discussed. And DOE hasn't said no to any of it.

We're doing one now—a transportation corridor from State Line through Sandy Valley into Pahrump to 95, because all those trucks are now going through the spaghetti bowl getting on 95 to go north. If they came through here you would take all that traffic away.

RM: Those are all good ideas.

GH: There's many a thing out there that the state of Nevada could have and should have had discussions about and still should.

RM: And still can, I think. I don't think the opportunity is gone.

GH: I think that one of the things we should be asking for is for them to clean their mess up on the Nevada Test Site. If Obama wanted to do a project that would make a lot of people jobs, it would be to start taking some of these cavities that we have out in Area Six that we have no intentions of using and start filling them in.

RM: Fill in the shot cavity? Is that the solution for it?

GH: Well, you make a mound on there, and you put clay on top of the mound so the water runs off of it. Right now there's water running right into those cavities, and that's trickling down, migrating down. But some of that could migrate out.

RM: So what you do is in effect put a clay dome over the cavity. That is another thing that we should be doing or could be doing.

GH: Well, they could clean up the water. We know that this water is going to contaminate down the tubes. We put in for some water rights in Frenchman Flats, and NSA protested and said, "No, we aren't going to let Nye County come out here and drill." And the reason is that they're afraid that we're going to migrate from the well contamination. If that's the case, then they need to clean their mess up, because we need

the water, and we don't have it available to us because of their mess. So if Harry really wants to be the senator that makes a difference in Nevada and Nye County, make them clean up their mess. Or if they can't, make us another water source. If they can't make us another water source, then they need to pay us damages.

RM: Because of the damage they've done to the water sources.

GH: Look at what they have done at Savannah River. Look at what they did at Oak Ridge, Tennessee. Do you know that Hanford, Washington, doesn't even know that there is a recession?

RM: Is that right? And we have 14 percent unemployment.

GH: Unemployment is 2 percent in Hanford. They sunk $2 billion in cleanup in Hanford.

RM: Oh, my God. And what do we have here? Nothing.

GH: Nye County has, what, 13 or 14 percent unemployment? If they clean up their mess, it would make jobs. If we made jobs, there's more money going into the treasuries—that gets the debt down. I mean, government has never been good at making jobs. But if they wanted to make jobs they could put 3,000 people in the Nevada Test Site, working every day to make it better and get that contamination down. That would make 9,000 jobs outside of the Test Site.

CHAPTER EIGHT

RM: How do you feel about building some reactors on the Test Site, or in Esmeralda and Nye counties and so on, and exporting power?

GH: I don't know if there's enough water in Esmeralda County to do it. But we do have the water at the Nevada Test Site. We could drain every single bit of water out of those cavities and make it into steam. Of course you are going to have to have a closed system, because that steam is going to be radioactive. But if you put a power plant right below Area 12, after you pump the contaminated water in it and make your steam, put your steam right in the N Tunnel as it goes all the way around and comes back out, you're back to water. It's cooled down. So you take the water, put it right back in the plant. Closed cycle. And we can control the releases of any leaks right on site.

RM: Yes. Or one idea I had, and you alluded to it earlier, is we make nuclear power here, send it down to California, and desalinate water. California takes the desalinated water, and then we take more of California's allocation of the Colorado River, or pump it up here, like you said.

GH: That could be done. But I think the federal government wants all of us out of the Colorado River.

RM: What are they going to do with it? Vegas can't go off of the Colorado River.

GH: I think in the future you're going to see they're going to make us go off it.

RM: Really? Why do they want us off?

GH: The lake is going down, down, down. But it's not Nevada that's taking it, it's California.

RM: That's right. They've got the big straw.

GH: But they have 54 congressmen and two senators.

RM: But if we give them their water through desalinated water, then what do they care?

GH: What do they care? But we care because the feds are going to say, "We're not going to let you use that water anymore." See, we get 300,000 acre feet a year. California gets, like, 2 million a year. Arizona gets more than Nevada. And it's the same way with the power. Most of the power goes to Southern California; very little of it goes to Nevada. Valley Electric's got a little bit. We're buying nuclear power from Palo Verde.

RM: Yes. Interesting isn't it? Do you think that Nye County could get a grant to study these ideas?

GH: No. Harry won't allow it. Anything that's got the "N" . . .

RM: The N word.

GH: Harry will fight it. But he has always supported the Test Site. And I think if you go and ask any of the unions—the laborers, the pipe fitters, the electricians, the operating engineers—they say they support Yucca Mountain.

RM: Oh, absolutely—jobs.

GH: And the casino employees fight Yucca Mountain because they're in Obama's and Harry's corner.

RM: It's funny that stored and spent fuel in reactors doesn't hurt tourism in France.

GH: What's that entertainer's name? Wayne Newton? I wonder what he is smoking these days. You know, he came out as a Republican for Harry Reid. "Look at what Harry's done, he's fought against nuclear waste," blah, blah, blah.

RM: You just made a trip to Washington. What happened there?

GH: I went to D.C. on Sunday and I attended the blue ribbon commission on the

Obama Administration's technology of what they're going to do with the repository. Of course, Yucca Mountain is off the table. During that meeting, I'll bet you that Yucca Mountain was mentioned 150 times. I just don't understand—if it's off the table, how come we're discussing Yucca Mountain? They're hashing over the same things that we hashed over for 30 years, now, on that commission. In other words, they're covering ground that the Yucca Mountain project has already covered. All they have to do is go back and read the history of Yucca Mountain, and they'll get the answers, and they won't have to spend all their time and money hashing over it.

I came back on Thursday morning, and immediately I got a phone call that there was a radio station from Massachusetts wanting to interview me. I met them at 1:30 on Thursday, and evidently they have a nuclear power plant there with a large amount of nuclear spent fuel, and probably high-level waste. They were told that it was going to Yucca Mountain, and now there is no Yucca Mountain. And they wanted to know what the economic consequences of this were going to be for Nye County and what they could do to help us.

I told them that the best thing they can do is just stay on board with their congressional delegation and try to pin them down to supporting Yucca Mountain, and do some community outreach. And if more of these states do some community outreach like that, then the politicians would change their minds. If the public is for something and the politicians are against it, and poll numbers look in favor of the public, they're going to change their minds. I spent an hour with these good people from Massachusetts, and they're on their way back home now. Hopefully, they're going to do the show, and I hope that they will send me something of what went on. It was a good interview, and I had a good time doing it.

I also dug out a little something here on the Climax. It had a couple of shots in it, on the bottom level. I think it was at least one or two.

RM: You have a document here. Why don't you read the title of it?

GH: The document is Nevada Test Site Guide, and this was published in November of 2001. This part is about the Climax—this was the first containment of how we were going to place spent fuel in the repository. And it was in the invert of the tunnel. As I told you last time we met, "invert" means the floor. In mining, we call the floor the invert, and we call the roof the "back." And the walls, or the sides, we call "left rib" and "right rib." In this case, all the fuel was going to be put into the invert, and then the door would be closed. Earlier, they wanted to put it into the ribs. These two designs were not picked, and they went to putting it in big casks and actually just parking them in a drift. Then they would probably put a door on the end of the drift, and the waste would stay there.

Like I said, in 1980, Dr. Voegele and I were working on Yucca Mountain things clear back then, and there wasn't even any work being done out at the Yucca Mountain site, other than drill holes. But Dr. Voegele and I were both working at G tunnel. We were doing heater tests for Yucca Mountain projects, and we were doing heater tests at the Climax. That's granite, by the way.

RM: Climax is granite?

GH: Yes, hard granite. But we had trouble holding heat. The heat would escape through the fractures, because granite can really fracture up, and, in this case, we had at least two shots in Climax. So the ground was broken up, and we couldn't hold any of the heat. And we would worry about the heat, the radiation, moving in the rock.

RM: Whereas the welded tuff is less fractured.

GH: Solid, other than when there's a fault running through it. It's just a lava flow. The

lava came off of the volcano, and it just deposited that lava, and it's pretty solid.

RM: Yes. Tell me more about the meeting that you just attended in Washington. It was a pretty important meeting, I think.

GH: Yes. The blue ribbon commission is in charge of studying the alternatives of where a repository is going to be. One group that I was very interested in listening to was a group on thorium, because thorium, as I was telling you earlier, is another radioactive material like uranium. Back in, I think, 1954, they had a thorium fuel cycle at Oakridge. The plant ran for four years. You'd have to burn a lot of fuel to get even a pinhead of plutonium.

And that's the reason why these Third World countries are trying to burn uranium, so they can get the plutonium. They put it into a reactor, burn it through the cycle, and take the spent fuel out, and then they're reprocessing it down to get plutonium for bomb-grade materials. There's not enough plutonium in the mineral to make it bomb-grade material. So that's one. Also, the half-life is much, much shorter than uranium's. And you can go to a liquid cycle or a solid spent-fuel cycle.

RM: You can use thorium as a liquid, in the cycle? Why hasn't it caught on?

GH: Well, the dollar is the almighty bible of this country. The dollar runs the country. I really believe it's down to the people that produce the uranium not wanting competition with something like thorium. But, here's the thing about it—we could give the thorium fuel cycle to these Third World countries and be able to go to sleep at night, knowing that they're not going to be making plutonium out of the spent fuel. It just makes sense that we start looking at thorium. And it's plentiful. It's all over Nevada, Utah, Idaho. A friend of mine, here, has several mining claims in Idaho, and it's just full of thorium. But there's no market for it now.

RM: Are there problems with mining it? Does it make a radioactive mess mining it, or anything?

GH: No. It's just like uranium. You know, if you pick up uranium in its original form, it's not going to hurt you. You have to put protons attaching—I don't understand the way it does it—but once you start throwing protons at it, or whatever it does in the cycle, and you charge it, then it gives off its charge and that's what makes it work. But you would have to do the same thing to thorium to be dangerous to you. In its natural form, it's not.

RM: Is there any chance Nevada could get a research program going in that?

GH: I don't know. Senator Reid, I think, is very up on thorium. I think that's one radioactive material that Senator Reid would probably sign on to. I'm not saying that to be disrespectful to Senator Reid, but I have heard him publicly say that we should be doing research on the thorium fuel cycles. And we do have Area 25 over there where Yucca Mountain is, so we have the place to actually do the work. I think thorium is going to be, in the future, a rival of uranium. It's going to probably be your next fuel cycle.

RM: And it's a proven entity, not theoretical. They've demonstrated it works.

GH: The Department of Energy—or back then it was the Atomic Energy Commission—had a reactor that was using thorium; and guess where the excess fuel is.

RM: Where?

GH: Nevada Test Site. They have 3,500 metric tons of thorium stored at Area 5. Those big Conex containers are buried under the ground, but if thorium was a valuable material they would be digging that out of the ground. I have a paper showing where they buried it.

RM: What other impressions did you get from this meeting?

GH: I got the impression that the blue ribbon commission has no idea, whatsoever, of

where they're going. They keep going back to the Yucca Mountain project. You know, I would just pull from 30 years of testimony. All that material is documented and it would answer their questions. Of course, we had the naysayers that don't want anything to do with nuclear energy. The state of Nevada was there, preaching "Everything is wrong about Yucca Mountain, and we know the right things to do about Yucca Mountain. But we're not going to tell you what the right things are."

To tell you the truth, I do not know where the blue ribbon commission is going to find a geological formation that is going to be able to live up to their needs. If it's not Yucca Mountain, I don't know where it could be. They don't want it in anything that's got water, so anything back East is out of the question. I mean, you may have some basalts there, but most basalt is deep in the ground. And you have to have a thick layer of basalt to be able to put a repository in.

In most of the Midwest and the East, water's within 50 feet. I just don't see how they can do a repository in that climate. The main thing is just you're trying to keep that fuel out of water so the water doesn't migrate and carry those radionuclides to somebody's well, or to a water system, and then you're drinking that stuff.

RM: Do you see the president's Yucca Mountain policy kind of unraveling here in the not-too-distant future?

GH: I've always said this, and my staff at NWRPO will tell you the same thing—that Yucca Mountain is not dead. I don't believe that they will be able to take the heat of spending $11 billion on a hole. And all the science that they've done over the years. And remember, Secretary Chu, Department of Energy, was for Yucca Mountain before he was against Yucca Mountain.

RM: [Laughs] That's right.

GH: I really think that Secretary Chu is wrestling with himself. He's a scientist. He was a scientist before he was the Secretary of Energy. I think Secretary Chu is looking at himself and thinking, "How can I be against this, when, with all the evidence that I've seen over the years of dealing with Yucca Mountain, I was for it? Can I be against something when I truly don't believe the administration has the right policy here?"

If I had to bet, I would bet that if Obama gets elected to a second term, I don't think Secretary Chu will be a secretary. I'm really thinking that he won't even make the first term. I think he'll find some way to get out. Because I don't believe he believes what he's saying. Most scientists, if there is evidence that it's the right thing, will fight tooth and nail to live up to the theory. Now he's wrestling with, "I don't believe in what I'm saying to this committee." I think Secretary Chu's a bigger man than most people give him credit for. I think he'll come to grips with how he can't support the administration's efforts in this. And I think he'll probably take a leave of absence or get out, one way or the other.

RM: And if the Democrats in the upcoming election were to lose control of, say, the House and/or the Senate, do you think that will change the ball game?

GH: Yes. But remember, I'm a Republican, and I'm a conservative, but we all did wrong things here. The Republicans are not clean, you know? When they were in power, they ran up the debt. They made some bad decisions on Yucca Mountain. I like President Bush, but President Bush could have taken care of this when he was in office. By executive order, he could have said, "Yucca Mountain will be the site."

RM: He could have done that?

GH: Yes. "And by executive order, I want the navy fuel from Idaho moved to the Nevada Test Site as soon as possible." He could've done that. And if he would have done

that, and the fuel was sitting there on dry storage pads—which is what they're doing with it now—until Yucca Mountain opened, then there wouldn't have been a problem with it. "Well, are we going to have a Yucca Mountain?" "Well, yes, we're going to have a Yucca Mountain. We've got tons and tons of fuel sitting there ready to go in it." So President Bush, by executive order, saying that the fuel would be moved to Yucca Mountain, would have put down the footprint so it would have been so expensive to move it back to where it came from that the Obama Administration would have had to go along with it. The Republicans are not clean. They did things wrong.

Any time in history that I've read about, where one party has controlled all three branches of government—the Senate, the House of Representatives, and the White House—things have never gone well. I think that they want to work bipartisan. One of the things they could have worked bipartisan would have been the repository in Yucca Mountain. Because everybody wants to keep the fuel safe.

I would be willing to bet you that if Harry Reid would let it go to the floor of the United States Senate, Yucca Mountain would be back on the table tomorrow. It's not science, it's politics. When we get to the future of the health, safety, and welfare of this country, we should not be playing politics with it. We should go with the science that we have, and do what is right. But we're not doing that.

The state of Nevada wants to protect Las Vegas and their gaming industry. But we're losing that. Every single day there's another state that's having gambling. I think in Chicago you can now play slot machines in a certain district. Most all your Indian reservations in the East have some kind of form of gambling. So pretty soon, Vegas is going to be looking at, "What are we going to do to get these people to come to Las Vegas?"

RM: That's right. And now there's Internet gambling, which could be huge.

GH: Howard Hughes did not like nuclear shots being blown up. He was afraid that sign at the Desert Inn would fall on top of his ninth-floor suite. But even Howard Hughes had to admit that all the bombs that we blew up out there did not stop anybody from coming to Las Vegas to gamble.

RM: That's right. In fact, it became a tourist attraction.

GH: Matter of fact, everybody that knew a shot was going off went up on the top floors, or on top of a roof, to watch what was going on.

RM: I have talked to old-timers who worked at the Test Site back in the '50s, and they said it was Test Site money in the workers' hands that helped build Las Vegas.

GH: That is absolutely the truth. In my heyday I have seen 12,000 people working there. We had dedicated trains that went in and out of Yucca Mountain every 30 minutes. There were 10 cars on each train, and you could put ten to 12 people on each car. Every 30 minutes there was a stream of them going in. When one got in, the next train would go out. And this was all day long.

RM: There were that many people working inside the tunnel?

GH: Well, at that time it was called Wyandot, and it was over behind the Palace Station near the Sahara. That's where DOE's offices were, back in those days. And then they moved it over to Loci Road. We called it the Loci Road compound. But all those people were dedicated to work at the Nevada Test Site. When we had shots going off, it was just like an anthill of people coming and going all day long. Unless there was something classified going on, it was in and out, in and out. And that's all you did, all day long.

RM: Did Nye County make a presentation at this meeting that you were at?

GH: Dr. Voegele. He didn't do it on behalf of Nye County. He was asked to speak to the blue ribbon commission as an independent consultant. I don't know who on the commission invited him, but somebody recognized that he had some very valuable information, and he was invited to speak.

Now, let me say something about Dr. Voegele. He's one of a handful of people that has worked on Yucca Mountain from Day 1—from the beginning to when it was opened. There's nobody that I know that knows more about Yucca Mountain than Dr. Voegele. He's been a good colleague of mine and a good friend for many, many years. I taught him everything he knows. [Laughter] No, he and Roger Zimmerman—he was a Sandia manager out there. He had a bunch of projects, and some of them were Yucca Mountain projects. And all the time, ribbing Dr. Voegele, I would say, "You guys all take all the credit in these papers that you produce, but I get no credit in these papers, and I did all the work." [Laughter]

And he told me, "Well, Zimmerman didn't give me any credit either." But he was a good colleague. And I have to say Darrell Lacy, the director of NWRPO—when he was hired, I voted against hiring him. Sometimes you make the right decisions, and sometimes you make the wrong decisions. I didn't think he had the background that would make a good director, but I'm man enough to say I was wrong. Darrell is the right person for the job. He did a wonderful job. I wish that we had the money to really just let him go out and do the things that need to be done, but we don't. We have to rein him in and say, "You know, we don't have that money." But he's a go-getter. And he's a team player.

In government, if your people are not team players, Bob, it's just not going to work—when you have one that wants everything by the book, and then you have another

guy who says, “Oh, Commissioner, I can do without it. If it will help the county, I can do without it.” Well, I wish I had more of those people who said, “Commissioner, we know that they’re having problems with the budget; I can do without those things. Let’s see if we can’t keep people on the payroll.” I need more of those types of people. And Darrell is definitely one of those people.

Another one on my staff is Levi Kryder. Levi is in charge of our scientific program, and he drills all the holes. He does all the science for it. Levi is a very good scientist and a good man. I’m lucky to have people like Joe Ziegler and Dr. Voegele. Cash Jaszczak—and I don’t believe I’m saying this [laughter]—in his own way, is a good consultant. He’s a good guy. When the program was in trouble—I can’t remember the year—we just didn’t have the money to keep all the people on. Cash and his company worked for nothing that year. So Cash is a good guy. Don’t tell anybody I said that. [Laughter]

I have a good staff. I have a lot of good people. All the girls working in the office—if it wasn’t for them, things wouldn’t be getting out. And I have a lot of people that work under Levi, that help Levi with all the clients. They’re all team players, and they work really well with each other. That’s what I’d like to see government go to, you know? When it works, let’s not change it, let’s not try to reevaluate. A lot of times, politicians know that that system works, but we keep on wanting to try to make it better. And when you’ve got it the way it works, you aren’t going to make it any better.

RM: The old saying is: “If it ain’t broke, don’t fix it.”

GH: I try really hard, when I’ve got something that’s working well for me and going right, to leave it alone. Unless they need me, I don’t have to stand over anybody and watch and rethink. Darrell is really a good manager, a good director. Just like this

program that we started years ago, getting oral histories. We did some books. We did a book on Manse Ranch. Very, very good.

RM: And we're doing one on the United Cattle and Packing Company.

GH: All that is history that we need to preserve. Darrell's been really supportive of this program, along with my counterpart, Joni Eastley. Commissioner Eastley has really been a queen on making sure that we get this.

RM: Yes, the two of you have been wonderful.

GH: Well, we're the oldest ones on the board, so when a new commissioner comes on, we have to take them and educate them on why we're doing this. Why are we spending $30,000 on oral histories? Or, why are we spending this money on a book? Or whatever. You sit them down. It's history of something that may go away, one of these days. Don't you want your grandchildren to be able to know that you were sitting on the county commission at that time, and we had to make decisions on this or that? You know, you're preserving a piece of history that, if it wasn't for us taking the time and the money to do it, would go away.

RM: And I think the history that we're doing now, on the Yucca Mountain project, such as this interview with you, is actually going to pay dividends in the future. There's the record, written down. From the participants.

GH: I've got to tell you, my wife has been dealing with Yucca Mountain since the '80s. She was also interim county manager five times during her career. She has worn every hat in the county, including Director of Public Works, Emergency Services Director, County Administrator, Finance, you name it.

RM: Maybe we ought to do an interview with her about county government.

GH: She's been an interim county manager longer than some of them stayed, you

know? [Laughter] She was highly respected in the finance community in the state of Nevada. She was on all those finance boards with the association of counties and so forth. Congressman Heller thinks the world of her. Every time I go back to Washington, it's, "Why didn't you bring Geneva? I really didn't want to see you. You're trouble. I think I'd rather see Geneva." [Laughter]

CHAPTER NINE

RM: You've already touched on this a little bit, but there's been an economic impact from Yucca Mountain because of the state's position on it. How do you see that affecting Nye County—how it is now versus how it could have been?

GH: It is going to affect us a great deal, because we were doing projects for every town in Nye County—parks, water projects, sewer projects, libraries, you name it. Those settlement agreement funds to PETT were paying for those projects. I had the EPA in my office not too long ago because they were concerned that we have an MOU, a memorandum of understanding, with the EPA. One of the things it said we would do is $2 million of chip seal paving every year to cut the PM10 (parts per million) dust down so we wouldn't be put on the list. And we had been doing that. This will be the seventh year.

EPA was afraid that we were going to pull out of the agreement. And they're absolutely right. We are pulling out. We can't spend $2 million. Where the money was coming from was the settlement agreement, the PETT. And the federal government was giving us millions of dollars a year in settlement agreement money. We were taking that money and putting it into the roads. So my thing was, "You and the state of Nevada have fought Yucca Mountain so badly, that now it's affected me, and I can't do the chip seal or paving. So that means I can't live up to the MOU."

And there were things in the MOU that they weren't living up to. I told them, "I can't produce millions of dollars with my hands out of the air." And the state is just going to have to understand that—"You guys [the state] fought it. You didn't want it." The money that we were paving all these roads with. In my district alone, since I've been in

office, the chip seal and paving came to approximately 60 miles.

RM: About when was the MOU?

GH: From 1999 to 2000.

RM: That many miles?

GH: Because it was a ten-year agreement. In that time frame, there's been approximately 60 miles of pavement and chip seal. And that's not counting what developers have paved or chip-sealed in District 3, my district in Nye County. The 60 miles is over and beyond what the developers did. So we've done very well in my district. We funded it every single year. But if we don't have the money, we can't pay for it. This last year we got, I think, about $9.5 million.

RM: And that's from what? PETT?

GH: Well, let me explain PETT. PETT is payment equal to taxes. Under the Nuclear Waste Policy Act, they were giving us the authority to tax Yucca Mountain as if it was a nuclear power plant. For example, Palo Verde nuclear power plant in Arizona produces approximately $54 million in tax revenue. Well, we could tax Yucca Mountain the same way under the payment equal to taxes. We negotiated years ago with the Department of Energy that we wanted to start that. It started off at $3 million, and it worked up to as high as $11.5 million. And the last year it was only $9.5 million.

But we did the things that the state of Nevada should have been doing. They get oversight, just like the county gets oversight. They could've negotiated a settlement agreement to PETT just like Nye County did. They chose not to, because they said it would look bad for them in court when they sued to keep Yucca Mountain from coming.

But they're not telling the people in Washoe County and Douglas County and Las Vegas, "We're in a deficit now, and we could be getting a settlement agreement to

PETT." The Nuclear Waste Policy Act absolutely gives them the authority to negotiate those figures. And they never did.

One thing that Yucca Mountain would have brought to us was that we could have been the pioneer college for nuclear studies. Engineering, chemical, you name it. They'd have been fighting to go to UNLV. Water projects. They wouldn't be taking water from northern Nevada to bring it down to Las Vegas. It was on the board that they were willing to negotiate doing a desalinization plant in southern California and piping that water to the Nevada state line.

RM: That's on the record, right?

GH: Well, it's been talked about. Yes. The industry was talking about giving the state $500 million a year. I don't know what they want, because if you don't negotiate, you're not going to get anything. And that's exactly what they got. All they're getting is oversight money. And to be truthful with you, under the Nuclear Waste Policy Act, you can't use your oversight money to be in favor of or against Yucca Mountain. That oversight is just to run your programs so that you can keep abreast of what's going on at Yucca Mountain. The problem is the state using that money for fighting Yucca Mountain. I don't think that's right, because if we did it in Nye County, they'd have the auditors in there in a heartbeat.

RM: What was the state using it for?

GH: Well, consultants that are primarily, probably, lobbying against Yucca Mountain. Halstead, for one, and probably some others. But that's my opinion, not the opinion of Nye County or the commissioners—that they've used that money to lobby. We're forbidden to do that with our oversight fund.

The other fund that we get money from is the independent scientific program. Nye

County is one of the only entities in the AULG that actually went and did our own science. Inyo County is doing some, but we started doing this years ago. We've drilled over 40 holes in and around Yucca Mountain. We've interacted with, probably, 150 different water zones in those 40-some-odd wells. And all that information is available. Some of this information is part of DOE's licensing application. We did the work, but we let the Department of Energy use it so they could do their licensing application.

People that are wanting to do TV translators, or the swimming pool, or building new senior centers—those kinds of things won't be done anymore, because we're not going to have those PETT funds to do those things.

We still have some money in PETT. We have money in capital project funds, we have a health fund, we have an emergency fund. All those funds, now, have been lumped into one, and the interest off of those funds is going to pay off the bonds that we just had sold to build this new jail. Instead of raising taxes to pay for the jail, we took all those funds and said, "We're going to live within our means, and we're going to take the interest off of those funds to actually make the bond payment."

RM: Well, that's real fiscal responsibility.

GH: But, here's the thing: you can't spend from the funds, because then your interest goes down to where you can't make the bond payment. So now we're going to have to be really careful of what we're going to spend in that fund. When the interest goes down too far, then we're going to have to make it up somewhere else.

That's the kind of stuff that our country ought to be doing. I mean, they should be figuring ways of taking a pot of money and making money off it so they're not going to have to tax the people of the country. And let me say this—I just want everybody to understand that I would not have gone home on vacation with the amount of problems

that the senators and Congress had at the time. I think they should have stayed there and taken care of the people.

RM: You mean just now, September 4, 2010?

GH: Yes. We have immigration problems, we have a debt problem, we've got health care problems. We've got all these problems, and they go home on vacation. Well, on the county commission we don't just stop the world while we go on vacation. Some of us have to be here every two weeks to make those decisions to keep this county moving. But no, they go home and campaign and do whatever. I think the people would have respected any of them that said, "I want to stay here and take care of the people's business, because it's first. My campaign is second." He would have gotten elected.

RM: I think you're right.

GH: But I think the people are taking a dim view—that they left Washington with all these problems on the table, and then they're out in the district talking about these problems when they should have been back in Washington taking care of them.

RM: Do you have any more thoughts on the blue ribbon commission meeting you just attended—any impressions or conclusions?

GH: I think that they're wasting their time and money. I think the industry knows how to build nuclear power plants. There is a new thing now, of making small reactors, like for Pahrump. It's 30,000, 40,000 people. They've got the technology now to actually put a reactor in the ground, and they wouldn't have to touch it for ten years.

RM: Amazing, isn't it?

GH: Then come back in ten years, pull the reactor out, put it on a truck, put a new reactor back in the ground, and they're going. That's the technology that they were looking at. I don't know if that's what their mandate was, that the administration gave

them. I thought it was finding a new place to put spent fuel. But they're talking about everything in the book.

There are some scientists on the panel. There are some people that used to be on the NRC. There's a broad spectrum, other than local government. There's nobody from the local government on there. Most of them, I think, understand the science of nuclear energy, but they ask some of the dumbest questions, you know? They'll just sit there and harp on something like interaction with local government. Well, you show me anything that the federal government puts to the people that doesn't say that the law needs to address local government and tribal concerns. It's always in the law.

In Nye County we started interacting with the communities when Yucca Mountain was being discussed. When we were cited as a site county, we had already gone out into the community. We went to the chamber of commerce. We went to all those groups. We were already talking to them. That's the reason why we don't have a problem with Yucca Mountain today. It's because we went out in the community early on and started educating ourselves and the people on the repository and the benefits, and the liabilities. Because there are always liabilities. But when it gets its license to construct, there could be 4,000 people working.

RM: And that's just directly?

GH: Construction. Well, the formula for it is, one job on the project takes three support jobs outside of the project, so you're talking three times as many people outside to take care of what they're doing. There would probably be anywhere from 900 to 1,200 permanent jobs once the repository was starting to operate.

RM: And then the repository itself would seed in other technological projects, like you've talked about.

GH: Sure. If the fuel is there, why wouldn't you put the recycling facility right next to it? So you take the fuel out of the tunnel, it goes right on down the line, gets chopped up, and put in the acid form. They take all the good uranium out. The only thing that goes back in the tunnels is the isotopes that they don't need.

RM: And then, ultimately, you transmutate it, put it in a new kind of reactor, and all of that could be done right here on the Test Site.

GH: I think that could be burned up. Tony Hechanova with UNLV is a very good friend of mine. He's a "traitor," though. He went to Saudi Arabia.

RM: He's not at UNLV anymore?

GH: Oh, no. He went over to, I think Saudi Arabia, or one of them—teaching.

RM: Is his program still going there at UNLV?

GH: Somebody else has taken over. I'm sure that the program didn't stop.

RM: I'm shocked.

GH: Well, you know, he's been at UNLV. He was hoping he maybe would get an undersecretary spot with the Department of Energy. That didn't go.

RM: He was a perfect guy for it, too, wasn't he?

GH: Yes, he was. They also talked about possibly making him an NRC commissioner. You know, I just think he just wanted to do something different.

RM: Sure. They're probably paying him a bundle over there.

GH: Yes, Tony wouldn't have left if they didn't pay him well. We signed on to a project of his called Hot Rock Experiment.

RM: What was that all about?

GH: It's a renewable energy project. The theory is, as you drill into the ground the rock temperature is going to heat up. In this part of the country, when I was drilling, it

was one and a half to two degrees per 100 feet.

RM: That much?

GH: It could be. So we're thinking that, at 12,000 feet, by injecting water into the hole, we could get steam. What do you need, 230 degrees? Somewhere around in there. So you drill a hole here, and that's where you're going to inject your water, to get steam. Over here you drill a well, and you frac the ground over to here. You want to frac the ground so the water will cook. Pump the steam from here. It goes into your turbine, runs your turbine, comes back around, and the moisture you pull will go back right back in the hole. And we could actually produce electricity.

RM: Kind of a geothermal thing.

GH: That's exactly what it would be. You could do this anywhere. We could do it back East.

RM: How deep would you have to go?

GH: It probably wouldn't be as far here as it would be back East. The temperature, you figure, at 15,000 feet is going to be pretty hot.

RM: And that was one of the projects that he was working on?

GH: Yes. We put in for a grant. Tony was talking to Senator Reid on that one. But we didn't get the grant. That would've been right over in Calico Hills, I think. It's just north of Yucca Mountain, where they wanted to put the first hole. That was a project of Tony's, and I was really up on that one. I thought that was a good project, and it was signing on to Senator Reid's renewable energy project that he wanted to do. So Nye County stepped up to the plate and went along with Tony's idea. He put in for the grant, and we didn't get it. I think it would have worked.

RM: Does Nye County have a mechanism to apply for grants for innovative projects?

GH: We apply for grants all the time. We have emergency service cop grants, renewable energy grants—that's a big one here—EPA grants, grants for senior centers.

RM: This is an idea that I've been interested in. There's a fellow down at the University of Southern California. He has his own institute there, and he's a Nobel Prize winner. He has the idea that you can take CO_2 that's coming off of a plant that's producing it, and you can take air, and make methanol gas. You can put methanol into a car, you can put it in a pipeline, you can make plastics out of it, medicine, everything. What I've wanted to do for a long time, since I got his book, is get him up here to talk to Nye County about his project and see if we couldn't get a grant for a demonstration plant for that.

GH: Well, that's what we want, if we're not going to get Yucca Mountain. There are plans for making Area 25 an energy park. Because there's plenty of land there. The solar companies would be setting up a five- or ten-acre demonstration project and would make power from it and see how it's going to work, before we actually build the big thing.

RM: His thinking is that ultimately you could just take the CO_2 in the air, add water and energy, and make methanol. Of course, you've got to get the energy somewhere, and my idea was, ultimately, that it would come from nuclear power. But it could come from solar or geothermal.

GH: The thing about it is, though, it's just like ethanol. I hear all these politicians saying how much oil they're saving from ethanol. [Laughter] But if you pen this out on paper, you're probably using more oil than you're saving because of all the energy you're taking to make the ethanol. It doesn't pan out. But what you are doing is causing the mother that has that baby to pay two times more for that milk, or that cereal, because we're taking corn off the markets and putting it into ethanol. So the food price went up

for that mother, and that's the bad thing. Trying to take care of a problem over here, we commit a problem over there that we never thought about.

When Dean Heller first got elected, I told his staff, "Watch out. I'm telling you, ethanol is going to be a problem for you because you're going to drive up food prices and milk." It wasn't too long after that, that same staffer came to me and said, "You pinned that right on the head, Gary. That's exactly what's happening."

RM: What I don't like about ethanol in gas is it knocks the hell out of my mileage, aside from the problem that you raised.

GH: And what's the diesel called?

RM: Oh, biodiesel.

GH: You can't buy it everywhere, so why in the world would you want to change everything over to run on biodiesel? I have to have a book to find out what station has it. I'm going down I-80, and now I've got to take a ten-mile detour so I can fuel up.

RM: Yes, with your 18-wheeler.

GH: With your 18-wheeler. People are not going to buy into a system until you've got a way where they can go down the road and pull into a gas station and get it. And you can't buy ethanol everywhere. My problem would be, with this guy you're talking about, how much energy is it going to take to get the CO_2 and the water to make the gas? Is it going to cost more energy to put in there?

RM: I forget his figures, but I don't think they're too bad.

GH: You're going to have to think about how much energy. With ethanol, it costs more for the energy, and you're not saving one barrel of crude oil. And I'm going on record here that, if you want to get away from the carbon blueprint today, then you need to go nuclear.

RM: I'm with you 100 percent on that. Yes. You can't do it without nuclear.

GH: You can't. Because it is 20 percent of our power supply today. So if you knock off all the coal, that's 60 percent. Solar and wind and those others, there's only 1 percent. I'll give the readers an illustration here: Palo Verde power plant. Three reactors at 4,040 megawatts. To produce the same power that Palo Verde's producing today, it would take 125 miles of solar panels to take care of Palo Verde. I know Senator Reid probably as well as anybody in Nye County. I don't think he's going to let you put solar panels on top of Mount Charleston.

RM: Moreover, I think you'd have a little trouble with snow.

GH: Well, I don't know. That might be a reflective thing, you know? You're higher, so you're closer to the sun, so you should be able to get more energy. But to get 125 miles of solar we're going to have to be on the mountains, because we don't have enough valleys to do it. You want these things in a straight line, directly at the sun. But in the mountains, or on the side of a mountain, you may get five hours of sunlight, and then you go into the shade, and it's not doing anything.

RM: Are you optimistic about the future of the nuclear industry and replacing coal and all of that?

GH: The coal companies are out here trying to find a way to make their coal more attractive environmentally. They're working every day to find better ways to burn the coal and better ways of capturing the CO_2 before it goes out of the smokestack. We have a bad thing with tires in this country. It would be nice to be able to burn them in these power plants. But, of course, there's too much pollution. But the coal companies around here are working every day to find a solution. And we have a lot of coal. But I think the cheapest energy today is nuclear.

RM: Certainly if you include the environmental consequences.

GH: Well, no. You can produce nuclear energy a lot cheaper than you can coal.

RM: You can?

GH: Yes. And it's renewable, too. Remember, Solar Millennium was going to build two 250-megawatt plants in the Amargosa Valley. And they were going to have to charge anywhere from 17 to 18 cents a kilowatt. Well, Las Vegas is only paying 14 cents a kilowatt now; probably less than that. So if they're selling it to Nevada Power at 17, 18 cents, they're going to have to sell it for 19 cents or better in Las Vegas and California. California is going to be the awakening. I can see it, because California has made it a policy that they want no coal or nuclear power coming into their state. All they want is renewable. Well, they don't have enough land to put in renewable.

RM: They will let nuclear power in, won't they?

GH: I think the only nuclear power they'll use is what's in their state. But who knows what's coming in to that transmission line? They don't know.

RM: No. There's some Palo Verde power in that line, no doubt.

GH: I'm sure the power company is saying, "This is not nuclear power or coal. It's all renewable." I don't believe that, either. The thing of it is, when those freeway off-ramp lights don't work, and you've got traffic backed up for 15 miles, and you've got a cop out there, trying to get the traffic going because you just had a blackout, that'll straighten them out. Or industry is saying, "We'll come over to Nevada, where they're more lenient."

But we can talk about White Pines County. Those are good people. They had two coal plants scheduled to go there, and, of course, Senator Reid was against those coal plants. They're very, very mad at Senator Reid over there. They were actually under the

thumb of the Department of Taxation, so their county commissioners' hands were tied. They couldn't spend money because the Department of Taxation wouldn't let them. They had two plants coming in. They could see dollar signs in the future. People were working in jobs; coal would be coming down through the railroad. The railroad would have made money. That would've made more jobs. New transmission lines coming in, which would have made jobs. And they lost it; that didn't sit well with White Pine.

RM: Are they going to go for another type plant?

GH: I think if a company asked them to put a nuclear power plant in White Pine County, they'd probably go along with it today. I don't know why we don't have a nuclear power plant on the Test Site.

RM: I don't either. It's a mystery to me.

GH: You would never have to use one drop of clean water from the ground. It's got contaminated water in every one of those tunnels up there. You're going to put that fuel right in there to cool it. So you take that contaminated water from that nuclear shot, put it right in the containment pond, and you wouldn't need any water for the cooling process. People have got to understand that when the fuel comes out of the reactor vessel it has to go into water, into those cooling ponds, for five years. Then you can take them out and put them in a dry cask. And then you CAN store them.

RM: But only after five years?

GH: Yes. It is way too hot, coming out of that containment vessel. It's way too hot to put in dry storage.

CHAPTER TEN

RM: I don't know why people don't talk about the Test Site as a power production site.

GH: I've got to correct you. It's not the Test Site anymore. It's the Nevada National Security Site.

RM: Oh, that's right.

GH: I don't want Senator Reid calling me up, telling me that I got it wrong.

RM: And if that's the way they see the Test Site, I don't see it as being a big job producer, which is what I'm interested in. I want to see thousands of people working out there, and a lot of them living in Nye County.

GH: There is a way of doing that. There is a project that we could put on there to do that. And like I said, that is to clean the Test Site up. Putting the material into those cavities, filling them up, and actually making a dome. And we have a dry lake bed out there, which is clay. That's what a dry lake bed is—it's nothing but clay. Take it and put two feet of clay over the top, so that the rain water won't percolate in the dust and run off. Just like they do with landfills. You could have 4,000 people working out there. It'd probably take many years of solid work just to fill in Sedan Crater.

RM: Is there a lot of radioactivity in the Sedan Crater now?

GH: I don't know. I know I don't want to go down there and find out. You've got to remember that NNSA doesn't like giving that type of information out. But that was a Plowshare program, and I don't think there's much national security interest in Sedan Crater, the shot. But radiation? Next time I talk to them, I'll ask them what kind of readings they have. See if they'll tell me.

I'm going back to Washington September 20, I believe. I'm meeting with the

EM—Emergency Management—director. They're the cleanup agency. They're doing cleanup at Savannah River, Oak Ridge, Hanford, and Idaho. I wanted to get three holes downgraded from Pahute Mesa because we know that that contamination is supposed to go off-site.

RM: From Pahute Mesa? I didn't know that.

GH: I wanted to put three holes in that valley to the north of Beatty so that we could be monitoring that water.

RM: As it flows off site.

GH: We would know how much tritium was in the water. If we get a baseline today, and if it goes up in 2012, we know we've got a problem. The Test Site once said, "Well, we're already doing that work on the site, and we'll give you that information."

And I said, "Yeah, you probably would give me the information, but I can't rely on your information. Because if the levels were really high, you would bring them down to make it not look as bad as it is, and I can't depend on your information as gospel." So I'm asking Inez at EM for three million dollars to do oversight and be able to drill some holes there so we can watch that contamination.

RM: Where is that valley in relation to Tolicha?

GH: It would be just down from there.

RM: Just south of there?

GH: Yes. And there would be three holes in that valley floor, because Pahute Mesa's just directly . . .

RM: Pahute Mesa's on the other side of Tolicha?

GH: Actually, Tolicha Peak is too far to the southwest.

RM: You can see it from I-95?

GH: Yes. Pahute Mesa's got a lot of trees on it. I mean, it's not desert. It's high desert. It's got all kinds of juniper and piñon pines on it, and we had to cut the trees down so that we could actually do a shot.

RM: Oh, really?

GH: Oh, yes. There was a lot more site preparation for a shot up on a mesa. And those shots are very deep holes. Down there on the flats, when we were doing those, they were around 3,000, 5,000 feet.

RM: That's straight down?

GH: Yes.

RM: And you drilled vertical holes on Pahute Mesa?

GH: Oh, yes. It's all hard rock. Those shots don't crater like they do down in the flats.

RM: Were you involved in any of those drillings?

GH: No. I did work on some water holes, and we went back in to grab samples every once in a while. We had set up a drill rig to go into what we call the post-shot hole. After we'd shoot the nuclear shot, we'd automatically come back and drill a hole, and we would angle it back into ground zero.

RM: You mean you would come straight down, and then come over, like they do with oil wells?

GH: Yes. They would whip that drill stem right at ground zero. Now, we weren't drilling 25-, 30-inch holes, but 12-foot holes. Your shot hole is anywhere from eight to 12 feet in diameter. They would drill that down to a certain depth, and that would be where they'd place the device. And then they would come back out, after they placed the device, and they would stem the hole.

RM: And what does "stem the hole" mean?

GH: The Test Site has about 58 different grouts and concrete mixes. They made some of the hardest concrete known to man. We put steel shavings in. We put in everything that was heavy enough to contain the shot. Our biggest mandate was water contain the shot. We didn't want it to come up; we wanted to go out. So everything we were doing in stemming was comparable to the rock around the hole. We were using steel shavings, bentonite, a grout. The scientists figured out where they wanted the grout, where they wanted the steel shavings, where they wanted the bentonite. And then they would come out, and at the top, of course, they'd cement that whole shot. Then you've got all these cables, miles of cables, because you've got experiments down there. You've got your firing cables, and, let me tell you, the fastest way you can get fired at the Nevada Test Site is to break a firing cable.

RM: Right. Because it won't go off, and they wasted all that money.

GH: Yes. It means they have to go back down, undo all that stemming, and place another firing cable. And they don't like doing that. So the fastest way to get canned at the Test Site is to run over or break a firing cable.

RM: So you drill the big hole, 12 feet wide. And then they put the shot down there.

GH: They put the device.

RM: Okay. And then they stem it. And then they fire it.

GH: Well, there are a lot of things on the surface that they do before they fire it.

RM: You're cutting down all the trees, for one thing.

GH: You cut all those trees down when you made the site. You've got the site, and everything is cleared. And they'll put a fence up right where they think it would break and sink in if it's a dig. And you've got all these things on site.

You've got a pit where your mud goes in. You're cutting such a big hole, and

you've got so much material that you're cutting, water will not bring it to surface. So what happens is, you're cutting the cuttings two or three times; water is not bringing it up. Once we start drilling, constantly we're putting in bentonite and water. This is 24/7, now, that we're trucking bentonite up that mountain, and putting it into the drill rig. And we don't recycle that stuff.

RM: The bentonite then brings the cuttings out?

GH: Yes. The heavier the material you're putting down there, the more cuttings it'll bring up. So the cuttings get in the bentonite, which is like a real thick mud, and it'll bring them up. And sometimes we'll put it through screens to screen off the cuttings, and then we have that mud pit, full of mud.

RM: And you dug the mud pit, right?

GH: Yes.

RM: And what do they do with the diggings from the mud pit? Just pile them there?

GH: Covered it up, after the shot. But we're cleaning them up now; I don't know why. They were trucking that bentonite down the road, down 95 back to Area 5. And I don't know why, because it's not hot, it's not radioactive. And bentonite comes from the ground; it's a mineral of its own. Even after 10 or 15 years, after taking the first stuff off, we found out that stuff is still wet.

RM: The bentonite's still wet? After 10 or 15 years?

GH: Yes. You take a Cat in there to go in and get it out of the hole, and the Cat'll just sit there. We've had to pull them out of the holes.

RM: The water just doesn't move.

GH: It doesn't dry. What bentonite will do is, the first two or three inches will get hard. But everything underneath there is still soft and wet.

RM: That's really interesting. So they're drilling this big hole, and putting bentonite in it.

GH: You're putting bentonite in there 24/7. You never stop.

RM: So that hole is filled with the drill and the bentonite, right? What makes it come up?

GH: You're pressuring more fluid down, so that makes the fluid come up.

RM: And then they stem it, or fill it?

GH: They may put a hard grout or a hard concrete down there where the device is located, what we call ground zero. And then they'll start using different materials coming up. And they may grout again. They may grout two or three times or five times, coming out, but everything we're putting in that hole is heavy.

RM: So it won't come out of there.

GH: We want weight on top of that device so it doesn't shoot up or shoot out. Once we stem the hole, then we've got to clean the site off. You've got all those office trailers that have to come off. And somewhere there'd be a red shack—that's where the firing goes on. And there are cameras all over the place. They know what they want to see, and they've got cameras pointing at that shot from every angle. Once they get the site all cleared off, all the equipment is taken back to Mercury or Area 6.

Then they have a shot day. You know when a shot day is coming because when you get a show-up time of 10:00, that means that you may be able to go through Gate 200 at 10:00. And if the winds are right and the president's on the ground, we can shoot. Remember, we cannot shoot a device if the President of the United States is out of the country. If he's on foreign soil, we won't shoot because there are so many anti-nukes out there. If the press said that we're shooting, it could cause him problems. He has to be in

the United States or in the air, not in a foreign country, before we will pull the pin.

RM: Okay, they shoot. Then what? Is the shot ultimately controlled from the Control Point?

GH: Area 6, yes.

RM: They called it the Control Point, I think, when I was there a million years ago.

GH: All the Test Site hands call it the Control Point. And they're sitting there. A room with all these flat-screen TV screens. I don't know how they fire it. I'm sure there's a code that they have to punch in on a computer. And it takes more than one person to do it; no one person can do it.

It's always checks and balances, with nuclear weapons. Like, today, if you had an airplane up there with nuclear weapons, and it was heading to deliver, there would be more than one person putting some kind of code in a computer before they'd allow that. That's so that one rogue person can't shoot off a nuclear weapon. As I told you earlier, I think that the president has the ultimate authority to do it, but at least one cabinet member has to also punch in a code word.

RM: Okay, now they shoot it. What happens next?

GH: What happens next is we sit there and watch it for a while. [Laughter]

RM: And if it doesn't go off, you say, "Oh God."

GH: There are still rumors that three didn't go off. And they're still . . .

RM: They're still there. Stay away. [Laughs]

GH: And we have one nuclear weapon sitting off the coast of North Carolina, I believe. The airplane was having problems, and he didn't want to go down with the bomb, so he dropped it.

RM: And it was deep enough that they couldn't recover it, right?

GH: They think it's covered up in the mud down there. They dropped it, and they didn't enter the code so it didn't go off. And I think there is one somewhere out there; I can't say where.

RM: I think it was in Spain or off the coast of Spain.

GH: We lost one there. Yes, there are a couple of nuclear weapons that didn't go off. Some of them we recovered, but there are two or three that we've never recovered.

RM: Once they finalize the device for shooting, and when they actually shoot it, you've got data coming out the hole, right?

GH: You've got milliseconds to get that data. I mean, once the fireball's out, the cables are no longer there. It just disintegrates everything in that cavity. It makes a big hole.

RM: Okay, then what happens? When do they drill the other hole, or whatever it is?

GH: Well, they'll monitor the ground movement. I would say within three or four days they're setting the drill rig up to do the post-shot hole.

RM: And how big is that one, on those vertical shots?

GH: It doesn't have to be big—probably nine and five-eighths diameter or less—because all they're wanting to do is get radiation samples out of ground zero and the water sample.

RM: Do they drill into the cavity itself?

GH: Yes. I did quite a few of them. We were putting water in the hole, and it was going to be constant once we got close to ground zero. Ground zero's got a lot of water, and we didn't want the contamination coming back up. Drilling into it level was not an option. We always wanted our holes angled up at a 45-degree angle. So once we punched into ground zero, the water that went into ground zero didn't come back up. (This is underground.)

RM: Oh, because you were coming into the ground zero at the top of the cavity?

GH: Yes. We were getting the same samples, but within five feet of punching through, I'm going to lose water, because the water will be shooting out into the fractures, because all that ground is fractured now. You get very little core once you get close to ground zero; it's all broken up. And you can actually almost push your way through there. Once you lose water, that means you're very close to ground zero. We know the footage between where we're drilling and where we're going to bust through it. They calculated that for me, so they'd give me, "You should be at 310 feet. You should be punching through ground zero." (Again, this is underground.)

The post-shot holes are not big in diameter like the nuclear shot hole. It's about ten inches, eight inches, something like that. And they know, primarily, what footage they want to start turning a bit. It'll go down so many feet, and then they'll start drifting it over toward the cavity of the nuclear shot.

RM: How far from the cavity do you start hitting the water from the fractures?

GH: It differs in different holes because the water table is here in one place, and out there on the mesa it would be a lot farther to the water table. All the nuclear shots that we detonated out there are either above the water table or below the water table.

RM: Why is that? That's just the way they did it?

GH: That's just the way they did it. The big thing is, when you shoot the bomb off, you want it to glass up. You want the heat to make a big glass dome in there so it keeps water from getting out. Water that's already in there will just stay there. The glass side of the cavity of the shot won't let that water go out. In theory, that's good. But ground moves all the time in this country—earthquakes and so forth. So our big thing is, if an earthquake was to crack one or two of those cavities in one of those shots, water could leak out.

And that may be what we're seeing at Pahute Mesa today, because we're looking at tritium moving off Pahute Mesa. That's the reason why I'm going back Washington, D.C., later this month to talk.

You know, we're getting pretty close to being done with this interview, so I'd like to thank my commissioners for all their votes and so forth so I could get the Yucca Mountain project going. This is my sixth year as Liaison Commissioner to Nuclear Waste. I think that's the longest anybody has ever served. Joni Eastley—I want to thank her. She's been a real champion on doing these oral histories and the books that you have published for us.

It's a great thing that we have those available for future generations to be able to read and understand how much the Paiute Indians have helped claim this part of the country. There was nobody here to work, to make the lettuce and the tomatoes and all the stuff that was shipped to Death Valley so they could mine that colemanite. Everything that they had came from Pahrump Valley and the tribes were instrumental in making sure that there was a workforce here. Other than the family, that's all that was here, the Paiute. They knew where the pine nuts were; those pine nuts went to Death Valley. They knew where the wood was. I have to give a lot of thanks to the Paiutes and all the Native Americans for their contributions in farming and helping us make Nye County what it is today. And Bob, I want to thank you.

RM: Well, I want to thank you for your outstanding discussion.

GH: Oh, this is my pleasure—I mean, talking about Nye County, and my work out at the Test Site. When we open the museum, anybody that has worked at the Test Site or Yucca Mountain—let us know, so we can take a little picture of you and make that part of the history at the museum.

RM: When we first started the interview, your wife, Geneva, mentioned the little church here in Pahrump Valley.

GH: My family built the log church over there. We had the logs all cut in Oregon, I believe it was, and shipped down here. It went slow, because we had to learn how to ship it out to lay the logs. But, yes, we built the church 30-some years ago. It's still there today.

RM: Where is it located?

GH: At 372 and Lola Lane. And it's still there today. They have church there regularly. It's something my dad and mom wanted to do.

RM: It's a wonderful thing.

GH: They put a lot of their assets into it.

RM: They financed it themselves? That's real dedication.

GH: Well, most of it was coming from the family because, when we first got out here, there was nobody but the family. When he bought that land for the church, it was only a handful of us. My mother is still living. She's in an Alzheimer's home over there, by the winery. She's doing very well. She likes it there.

RM: And your father is deceased?

GH: My father died a year ago. He had an abscess on his tooth. Evidently it broke, and the poison from the cavity got in his system, and they couldn't get it out. But he had really bad health problems. He had contracted too much radiation at the Test Site. Most of his cancer was work-related, and the Feds were taking care of all his medical bills and so forth.

That's the reason it's very important that you go by the rules when you're working with hazardous material and hazardous waste. You may think that when you're

wearing that badge on your clothing, it gets in your way. But there's a dosimeter in that badge, and if you get too much radiation and get contaminated, when you go through Gate 100, it's going to set off the alarm. They'll take you off the bus and get you taken care of before you really have problems.

RM: One of the things I wanted to ask you is, when you're drilling into the cavity and you hit the fractured rock, then the water comes squirting out, right?

GH: No. That's the reason why we're drilling at 45 degrees, so the water will go down into the cavity, and won't come back on up.

RM: Even before you hit the cavity?

GH: Well, you're going to get some radioactive material.

RM: That's what I was wondering. But you're wearing the suit, right?

GH: Yes, we're dressed out. What we're worried about is the alphas and the betas. We're not going to get a lot of the gamma and X-rays.

RM: Is that a lot?

GH: Yes. It's over the limit. But you're in rubber boots, and you're in coveralls. If the radiation goes up more than expected, they could ask you to double-suit or triple-suit. And then they'll limit your time so your body can get rid of the radioactivity. Like, at P Tunnel, if I was in there for an hour and a half drilling, I'd have to come out for three hours. So I was working three hours a day and reading a book for the rest. We had to sit on the side of the rig so that our bodies could get rid of the radiation. But it's not very often that that happens. We don't usually get to ground zero, other than drilling.

RM: I want to thank you again. You've made a wonderful contribution.

GH: I'm glad. I was holding back on talking to you so that you could get all the important people.

RM: Yours is a unique view, and a very high-quality view.

GH: One person I think you need to interview is Darrell Lacy.

RM: I did.

GH: I kick myself in the butt for not voting for him, but Darrell Lacy is probably the best administrator we've ever had, in directing the NWRPO. And Michael Voegele knows more about the Yucca Mountain Project than anybody I know. Like I say, I taught him everything he knew, back in G Tunnel. And, you know, he's retained most of what I taught him. He'll love this interview. [Laughter]

RM: But your interview is really connected to the county, and you were a worker there.

GH: You know, when I first came to Pahrump in 1969, I had just gotten out of the service. I'd just come back from Vietnam. And there were maybe 600, 700 people in the valley. My first job after I got out of the service—I mean, really meaningful job—was at the cotton gin. As I told you, the cotton ginner that normally would run the gin had a heart attack. I ended up being the ginner that year and the next year, and then they transferred me to Palo Verde, Arizona, not more than three miles from where the Palo Verde nuclear power plant is. I was there for a couple years, and then I came home and went to work out there in Death Valley. And then I went to the Test Site, and I stayed with the Test Site for 18, 20 years.

It was a good job. It was a steady job. In Las Vegas you'd be a loader operator, and you might be there for three months. And then they didn't need you; they'd lay you off. Well, they didn't do that to the drillers out there. They didn't want us getting another job because they might need us in another month so they'd find other things for us to do and keep us on the payroll. So it was pretty steady for us.

It was a good paycheck, and as long as you played by the rules you didn't get

contaminated. My dad made some mistakes and got into some stuff. One of the things that they do is put their badges in the lunch box while they're working. That's a no-no, because you're not protected with that badge when it's in your lunchbox.

Nye County's been good to me. I went back to Alabama for a couple of months to see if I could survive there, and I couldn't wait to get back to Nevada.

RM: Well, Gary, I think you're a real Nevadan. And I don't tell that to very many people. I consider that a compliment.

GH: My wife is a true Nevadan. She was born in Yerington. And all my kids are Nevadans. They were all born in Las Vegas, Nevada.

I had the pleasure of sitting on a television show with Tim Hafen and Button Ford after Bill Mankins passed away, and we were talking. Tim knew more about Pahrump than anybody I know. But all these farmers would have rough months, and they had to have fuel to run these irrigation pumps. I can remember Tim saying, "I'd owe Bill Mankins $5,000 for fuel, but he wasn't dunning me for it every day, you know?" And the same way with me. I'd be in between jobs, and I'd stop there and gas up and charge it to my account, and sometimes it'd be three months before I could pay that fuel bill. Bill was a good guy. And his wife was a county commissioner. Really, there's somebody you need to talk to.

RM: Yes, I talked to Pat.

GH: Pat Mankins is a beautiful person. And Joe Garcia. He was a county commissioner.

RM: I know Joe. He was a commissioner when I first started this.

GH: And Jeff Taguchi, from Beatty. Remember Bill Copass over in Amargosa? When he died, his wish was for Jeff to take his term. We sent that to the governor, and the

governor appointed Jeff. And Sam Wellman. He was the county manager.

RM: Now, Gary's going to identify the people in the picture that he's showing me. We're going to include it with his history.

GH: From the left is my mother, Dorothy Jean Killen Hollis. The next one would be my father, Charles Kermet Hollis. Then we've got, starting from the left, the children: Larry W. Hollis, Linda Hollis Beasley, Brenda Hollis Reynolds. And then me—I was the oldest—and that's Charles Gary Hollis.

RM: Can you give an approximate date? You look like you're about five, six years old.

GH: I would say probably 1952, and that was probably taken around Flat Rock, Michigan.

RM: Thank you, Gary. This has really been a wonderful interview.

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