BUD'S MEMORIES OF

OPERATION HARDTACK

Nuclear Tests

Johnston Island

1958

Two High Altitude & High Yield Nuclear Shots

TEAK and ORANGE

Bud's Memories of the efforts required to achieve the launching of two Nuclear Shots using the Army Redstone Rocket

ACKNOWLEDGMENTS

I would like to begin this memoir by giving many thanks to my numerous friends and family members who over the course of my lifetime inspired, and encouraged me throughout the process of writing my memories. There are so many wonderful people who have continuously helped me accomplish such a huge task. Several people have played a decisive role in editing and revising, I can't even begin to name everyone.

Six people I would like to recognize are my care-givers, (1) Keegan O'Ravez for helping me find and organize the massive amounts of various data which are a part of my life, (2) Stefani Bax for helping me further correlate the information, (3) Emmanuel M. Lorenzo, who helped prepare the first draft of ''TEAK'' and ''ORANGE" documents which were distributed, (4) Allison Ha who helped with the task of reducing the size of "TEAK" and "ORANGE" documents, (5) Brooke Bulf, with her involvement in the final editing and review and (6) Luke R-G for putting together the final digital copy of the document.

Also, I would like to thank the following friends: Tom Pocock, Richard and Marilyn Hughes, Richard and Diane McLaughlin, Christy White, Alicia Wall, Kimberly Gordacan, Judy Smith, Tony Pizza, Herb Mansbridge, Patrick Brady, Lindsay Lowe, Dan Ferrin, Eric Anderson, John (Jack) Le Doux, Lt. Colonel William Mowery, U.S. Army, John Westcott, and Daniel N. Shockey. Additionally I would like to especially thank Robert Quinn as he provided me with many comments and recommendations at our 2012 Seabee Reunion about the rough drafts regarding Vietnam and Hardtack.

Most importantly, I would like to extend my deepest gratitude to my late wife, Delores, my children Brent, Charmaine, Jill, and my late son Bob for providing support, love and honest feedback when needed to complete this memoir. I would not have been able to fulfill this lifelong goal without everyone's continuous support.

Please feel free to contact myself if any questions, comments, or concerns arise regarding this memoir. My contact information has been listed below.

Best Wishes,
Robert (Bud) Vance:
Cell Phone: (707) 293-0838
Home Phone: (707) 832-3354
Charmaine Vance(Daughter)
Cell Phone: (480) 226-9675

Email: budphilo@comcast.net

Rev. 10/22/2021

CONTENTS OF BUD'S MEMORIES FROM TEAK & ORANGE SHOTS-

OPERATION HARDTACK

BUD'S MEMORIES OF EXPERIENCES
ON
OPERATION HARDTACK

PART 1

OPERATION PLUMBBOB was the title of the Nuclear Testing in Nevada in 1957. As I recall, we finished our part in the Nuclear Tests at Mercury, Nevada and returned to Albuquerque in August 1957. Once back in Albuquerque, New Mexico, we started planning for the Nuclear Tests which were to be held at the atolls at Eniwetok and Bikini. Once we deployed to the Pacific, the overall plan was for my boss, Lieutenant Colonel Mowery, US Army, to be in charge of the construction on Eniwetok, and for me to be in charge of the construction on Bikini. The nuclear testing in the Pacific was to be referred to as OPERATION HARDTACK. When Operation Hardtack took place in 1958, I was a full Lieutenant in the U.S. Navy, Civil Engineer Corps. The Weapons Effects Testing (WET) Organization was composed of officers from the Army, Navy, Marine Corps and Air Force, with the necessary qualifications for Nuclear Testing Operations.

During the six-month planning stage, I was able to be with my wife and twins, (Charmaine and Robert B. (called Bob) once again. Of course, I was never allowed to tell or discuss with my wife and children what I was doing and when I would be leaving again because everything we were doing was classified; I had a Top Secret, plus a Q Clearance that grants me access to a nuclear ***Gadget*** information and data. It was obvious to her that I was involved in the nuclear testing program due to the fact that there were some Officers' wives who had been in Albuquerque for several years and they knew, from previous experience, that their WET (Weapons Effects Testing) husbands would be going once again to the Pacific testing grounds in Eniwetok and Bikini sometime after the first of the year 1958. Despite the restricted discussion of when I would depart from home, I told my wife that I would be leaving in a few days. At this time, Charmaine and Bob had gotten the measles and my wife, Delores, was expecting a son about the first part of April 1958. During the time that I was involved with the Nuclear Tests in Nevada, I did manage to get home on a weekend about once every other month however, this would not be possible when I deployed to Bikini. Although there were to be some barge shots planned for Bikini, I was mainly concerned with the construction of the Rocket Control Center, a Tower for launching a Rocket and building other associated instrumentation testing facilities. Two nuclear "***Gadgets***" (This what LCOL Mowery and I called a nuclear device) were to be shot off high in the atmosphere. Such had never been done before, so no one knew what the results or the phenomenon would be from such an explosion especially of a high altitude and the size of the ''***Gadget***.''

Shortly after I left, our dog bit the postman, the twins put crayons in the gas tank of our car. The TV broke down. Soon after, the baby was born, but I realized I could not be present for my family due to the overwhelming assignments on the job. Lieutenant Colonel Mowery (Bill) and I traveled together along with other members of the WET (Weapons Effects Tests) group to head for the Eniwetok. Since Lieutenant Colonel Mowery and I had been together so much of the time on OPERATION PLUMBBOB, Lieutenant Colonel Mowery insisted I call him "Bill."

When we left the United States, we traveled to Hawaii on a propeller commercial plane. I can't remember the name of the airline, but the plane was chartered by the Military and it was a long flight to Hawaii, probably about 8 hours. We landed in Hawaii, and we were supposed to have about a 3-hour layover before the plane would take off for Eniwetok, but there was a delay because the airport personnel had some other plane priority refueling tasks. About 2200 we boarded the plane and as the plane started taxing to the runway, one of the tires started to lose air and was going flat. The plane stopped, and a bus was sent out to the plane, and all of us were unloaded from the plane and put aboard a bus which took us back to the airport terminal.

At about 0330, we boarded the plane once again. Bill turned to me and said, "Maybe this time we will finally get in the air." The plane started down the runway picking up speed for a takeoff. All of a sudden, the plane began to vibrate and shake. The plane was slowing down because the brakes were being applied to stop the plane. I could see that the end of the runway was not too far away because I was sitting by a window. I said to Bill, "I sure hope that the pilot stops this plane soon because the end of the runway isn't too far away." The plane stopped just before the end of the runway. The problem was caused by one of the tires blowing out. Once again, a bus was sent out and took us back to the airport terminal. Bill inquired as to when the plane would be ready to go again and was told that the plane would be ready to go in another 6 to 8 hours. Exhausted, Bill tells me, "You and I are not going on that airplane anymore. I'll get us a ride on another airplane."

This was the second time Bill had gone to the nuclear tests at Eniwetok, so Bill had a lot of connections with the pilots who flew cargo to Eniwetok. He managed to get us on a Military Cargo plane which had a load of cargo for Eniwetok with a high noise level caused by the loud propeller engines, but we had enough room that we could lie down instead of sitting on the canvas seats during the whole trip. As I recall the plane landed on an airfield at a small island for refueling. I think that the flight to Eniwetok took about 14 to 15 hours or more.

The WET personnel who flew on the chartered commercial flight stayed awake during the entire flight from Hawaii to Eniwetok. Nobody felt at ease during the whole trip. We landed on one of the Eniwetok Atolls. Bill stayed on Eniwetok and took charge of all of the construction on these Atolls.

I boarded a small plane and flew to one of the Bikini Atolls and these atolls are located 11 degrees North, which is just above the equator. On Bikini, all of the WET officers lived in tents on one of the Atolls. On this same atoll, there was a mess hall that was very nice and served wonderful food and every Saturday night, we would have T-bone steaks and strawberry shortcake. There was also a landing strip for small planes and helicopters. The mission was to get two high altitude shots off before the nuclear test moratorium that may go into in to effect sometime in the later part of the year. Because of this, the construction work had to be completed as soon as possible. We worked 12 hours a day and seven days a week, but this work schedule did not last too long because the construction workers were eventually exhausted due to the overwhelming work and production of some of facets of the work, electrical, plumbing, etc. In view of this, the "top brass" decided to work 12 hours a day, but only six days a week. Under this new arrangement, the productivity increased greatly, and the number of rework items was minimal. Sunday was a

day of rest, and this gave people a time to get rejuvenated. After all, there wasn't much to do on Sundays except to read or sit on the beach and look at the ocean. My principal job was to get a concrete, Rocket Control Center built, erect a Rocket Tower, and construct all of the other instrumentation Rocker launcher pads and associated facilities. Dr. Debus was the one that I had to coordinate with because he was in charge of the launching of the Rocket, a Redstone Rocket.

Now for a little history - Dr. Debus was Dr. Wernher von Braun's right hand man, who performed the rocket launching. Dr. von Braun and his group were in Germany during World War II and developed the V2-Rockets for Germany; that is, when Dr. von Braun wasn't in prison for espionage when he objected to having his rockets being launched to attack civilian populations.

When the war was ending, Hitler ordered his troops to kill Dr. Wernher von Braun and his group. Hitler did not want them to fall in the hands of the USA or Russia. Dr. Wernher and his group escaped and came to the side of the United States.

A little history - Undoubtedly, Dr. Wernher was the space visionary, and was hired by the Army. Dr. Wernher von Braun and Dr. Debus were in charge of developing the Redstone Rocket for the Army. In November 1958, an Army General, McDarius, inquired Dr. von Braun if he could modify the Redstone Rocket and launch the first USA satellite in orbit within 3 months and Doctor Braun stated that he could do it. Dr. von Braun and Dr. Debus modified the Redstone Rocket (800 modifications would be required) and placed the first USA Satellite into space on January 31, 1958. After the Johnston Island Nuclear shots, Dr. Debus became Director of the Kennedy Space Center and was responsible for launching our astronauts into space. Dr. Wernher von Braun became Director of the Marshal Space Flight Center and developed the Saturn V Booster Rocket to launch the first men to the moon. Dr. Wernher von Braun is considered the greatest Rocket scientist in history.

The Atoll on which the Rocket facilities were located was some distance from the Atoll on which I lived, so I had to commute each day via one of many helicopter shuttles runs, by boat or a small plane. One time I was waiting at the helicopter (chopper) terminal on the Rocket atoll for the next chopper to take me back to the atoll where I lived, and as I walked out to board the chopper, one of the chopper crew said that I could not board because someone else had a higher priority and that I would have to wait for the next chopper. I was not really in any hurry; so this was no inconvenience. The next chopper landed, and I boarded that chopper along with one other person. The chopper took off and, after we had been in the air a short time, our chopper pilot said to us over the headset that we wore, "A chopper has crashed on one of the atolls and we are going to land and pick up the personnel. Be sure that your harness is tight because we will be doing some tight turns." As we approached the atoll, the chopper laid visibly on the ground on its side and smoke was coming from the chopper. I could see about 6 people standing some distance away from the chopper. This was the chopper which I was supposed to have taken. Our chopper landed and picked up the 6 people. No one was seriously injured. Needless to say, the return flight on our chopper was crowded.

I worked daily and closely with Dr. Debus to make sure that concrete Rocket Control Building was built expeditiously and could properly accommodate all of the instruments which had to be installed by Dr. Debus' group or crew. On April 7, 1958, I received information via Ham

radio that my wife had given birth to a boy in the Kirtland Air Force Hospital in Albuquerque. I was told that I should try to get a boat to the one atoll where a Ham Operator was located. An arrangement was made by a Ham radio operator so that I could talk to my wife about naming our son. I finally managed to get a boat to a Bikini Atoll where the Ham Radio Station was located. I can't remember what time the call was made; so, I do not know what time it was in Albuquerque, N.M. My wife was still in the hospital. The connection was not the best, and, therefore, it was difficult to understand what was being said. There was a lot of static I remember. Of course, with Ham Radio, only one person can talk at a time. When the one person is finished talking, that person has to say, "Over" so that the other person knows that it is time to talk. After quite a few tries, we finally felt that the name of our son was to be Brent Devin Vance.

After many months, the Rocket facilities on Bikini were about 96% complete and everything would soon be ready for the two shots. I thought that this was wonderful because after the two shots, I would possibly be heading back home and I would get to see my wife, and children, which would include our new son, Brent. But that was not the case at all. I receive a call from Bill and he tells me, "You will have to take down the Rocket Tower and any moveable equipment and facilities and rebuild all of the facilities on Johnston Island which is about 760 nautical miles west of Hawaii.'' Up until this date, no one had ever exploded a nuclear "***Gadget***" with such a large yield at such a great height in the atmosphere, and, therefore, no one can predict with any accuracy what the phenomena will be. Ultimately, Lewis Straus, Chairman of the United States Atomic Energy Commission, moved this nuclear testing to Johnston Island, which is about 760 nautical miles from Hawaii.

My task was to have the Tower dismantled, as well as all rocket instrument launchers and equipment. Then these would be shipped to Johnston Island. Since it would take some time for the packing, crating and shipping of all of the material and equipment, my boss, Bill, had some official business reasons for me to return to Albuquerque for a week to obtain needed information and official guidance. I thought how Bill has always treated me so nicely. Of course, this was amazing news to me as I've been anticipating to see my family for a huge while, and specially to see the new addition to our family, Brent. It was wonderful to see my wife and children; I was pleased that I could at last see our new son, Brent.

When I obtained the official information that Bill needed, I flew to Hawaii, and then on to Johnston Island.

BUD'S MEMORIES OF EXPERIENCES
ON
OPERATION HARDTACK

PART 2

Johnston Island is 760 nautical miles west of Hawaii and is 16 degrees above the equator. There is a long section of the Johnston Island that runs from Southwest to Northeast. The runway is on the East side of the Island and runs the length of the Island, which is over one mile. If a plane doesn't stop before the end of runway, then we will end up in the ocean. Some distance to the West of the runway are houses, barracks, a mess hall, a medical facility, and a power plant (six diesel electric generators). Further West of the housing area is a taxiway. Further West of the taxiway are aircraft hangers and storage buildings. Further to the North of Johnston Island and not too far way, is very small island, called "Sand Island". Later I learned that this island is also called "Bird Island" because it is inhabited by many, many species of birds.

After the plane landed on Johnston Island, I went to the airfield terminal building. Once inside, I only saw civilians. Toward the back of the building, I saw a sign over one of the desks which read: "Military- New Arrivals." I walked up to this desk and handed a copy of my orders to the Air Force enlisted airman behind the desk. Then this person looked at my orders, and said, "Lieutenant Vance, welcome to Johnston Island. You will be billeted in room 25 in apartment building 50. This packet of information will show you the location of the apartment building, the large cafeteria and its hours of operation, the laundry schedule, the location of the offices of the different organizations, the medical dispensary, dental office and other miscellaneous information concerning Johnston Island. There's a shuttle bus just outside the terminal that will take you to your apartment building. Also I have a note here that indicates that your footlocker arrived from Bikini Atoll and has been placed in your room.'‘

After I arrived at my room, I took off my gabardine type khaki uniform and put on my cotton khakis. The cotton khaki shirt has short sleeves and is open at the neck. I pinned two silver bars on the right collar of my shirt indicating that I am a full Lieutenant in the U.S. Navy, and on the left collar of my shirt I put the insignia for the U.S. Navy Civil Engineer Corps, which some people often say that it resembles two crossed bananas. Since I knew I would be out in the sun great amount of time, I needed the best protection from the sun rays in my eyes and face, so I purchased a Tan Cap at a nearby shop and it looked like a ball player's, however the front of the cap extended out much further than a normal cap. After the fact, I placed the two silver bars on the front of my cap so that my rank would be apparent to others on the Island.

Once I had unpacked my bags, I went to the ‘'Weapons Effects Test Office." The abbreviation for this office is called, "The WET Office." In this office I met with second class Petty Officer Jones, who had been on the Island for two days and was to report to me for duty. I told him that his job was to handle the office work, classified documents, perform any drafting duties,

assist me in monitoring the construction and perform any other tasks that I require. Perplexed, Petty Officer Jones said, “I have seen only a few military people on the Island. It seems that the Island is filled with civilians. Why is this?”

“It is true that there are not many military people on this Island. The Commander of the Island is Brigadier General Dawson, U.S. Army, and his Chief of Staff is Colonel Jamison.’‘

I could see Petty Officer Jones listening intently to the details I was about to reveal. I continued, ‘’I report directly to Brigadier General Dawson for administrative requirements. Then there is an Air Force Major whose organization consists a few enlisted airmen to handle the airfield control tower, coordinate all flights in and out of Johnston Island and provide maintenance on the aircraft. There are also about six other WET officers on special scientific projects that come to the Island periodically for short periods of time, but I hardly ever see them and sometimes you may never see them. Plus there is a squad of Marines whose main purpose is to provide any security that is required. Then there’s just you and me.”

He nodded as he was listening.

“The civilians on this Island seem to be from many different organizations. Besides the Homes and Narver civilian construction personnel, there are many civilian scientists, doctors, and engineers from such organizations as: USA Ballistic Missile Agency, Lawrence Livermore Laboratory, Los Alamos Laboratory, Edgerton Germeshausen and Greer, Sandia Corp, plus many more from other scientific Laboratories and organizations associated with the Army, Navy and Air Force. There are so many organizations involved in this project on Johnston Island that I just don’t remember all of the names.”

“ I have noticed that everyone wears a security badge with their level of Secret Security Clearance. My badge indicates that I have a Secret security clearance. Even though somebody on Johnston Island may have a secret security clearance, we are not to reveal any of our classified data to them unless they have a need to know such information. The ‘Need to Know’ principle is of paramount importance on this project.”

Petty Officer Jones' eyes scanned my badge for a little while and said, “Your badge indicates that you have a Top-Secret security clearance; so I assume this means you will handle and be responsible for all top-secret documents.”

“That is correct.” I told him.

“I noticed that your badge also indicates that you have a 'Q' clearance. Just what does this mean”

“A ‘Q’ clearance means that, if needed, I’m allowed access to a nuclear “

‘Gadge’t information and data.”

“From the air, Johnston Island looked like a very small Island. Approximately how long and how wide is Johnston Island? Also, what is the temperature range that I will be subjected to while I am here? Also will I need any rain gear?”

“Johnston Island is approximately 7000 feet long and the width varies. The widest part of the island is about 2,500 feet. The weather here is very nice. The nighttime temperature drops to about 73° and the daytime temperature is usually about 77°. However, sometimes the daytime temperature can climb up to 79°. Humidity is about 70 to 75%. Very little rain falls on Johnston Island, and during the time that we will be here, we don’t expect any rain. Therefore you will not need any rain gear. The climate here is much better than at Eniwetok or Bikini Atolls.”

“What is our work schedule?”

“In order to expedite the completion of the project, normally we will be working a minimum of 10 hours a day, six days a week. In reality, you and I will be working more than 10 hours a day. Sunday will be a day of rest and rejuvenation.”

“This afternoon I have a meeting with Doctor Debus and the Homes and Narver (H&N) construction manager, Mike Benson, to try to determine what can be done to shorten the construction time from four months to about two and half months. When We built the Rocket launching facilities on Bikini Atoll, the construction time was four months.“

“I have one question for you before you leave. How old is Doctor Debus and does he speak English?”

“Doctor Debus is a distinguished looking gentleman with a receding hairline, and he is about 50 years old. He has an excellent command of English language and can express himself in an outstanding manner, both verbally and in writing. Not only is he a very intelligent person, but also, he has a very pleasant personality and a good sense of humor.”

I walked next door to the (H&N) office and met with construction manager, Mike Benson.

“Mike, you know that it took four months to build the facilities on Bikini Atoll, and because there may be a moratorium on above ground of nuclear testing soon, I estimate that we will have to have the facilities ready for the first shot (“**TEAK**” Shot) in about two and half months to make sure that any moratorium date will not affect the two shots. So, we need to figure out how to reduce the construction time. I’m going to propose to Doctor Debus that we only put siding on the tower at levels 1, 3 and 4. This should take about a week or so off the construction time.”

“I have a proposed suggestion to reduce the construction time by another week. When we

built the Rocket Control Bunker on Bikini Atoll, we formed and poured large separate concrete race ways under the floor slab. If Doctor Debus will permit us to pour open raceways about 2 feet deep and 24 inches wide when we pour the floor slab, this will reduce the amount of forming required and will reduce the construction time about one week. Also, the open raceways will make it easy for us to lay quickly and easily all of the electrical and signal cables. The open raceways will be covered with boards and be flush with the Rocket Control Bunker floor. You'll need to get concurrence of Doctor Debus."

"I'm sure I can get Doctor Debus concurrence."

"Also, I will be using 4,000 psi (pound per square inch) or greater concrete mix in lieu of a standard 3000 psi concrete mix for all concrete pours. By doing this, the concrete will have adequate strength for erecting the tower within 10 days in lieu of 28 days, and this will reduce the construction time by about two weeks."

"We have to run power to eight small instrument rocket pads which run along the west edge of the runway. I know that for safety reasons, the standard required practice is to bury power cables to a depth of at least 3 feet. What if we run the power to these Rocket pads through chases on the ground surface that will be covered with at least 6 inches of base rock. If this were done, how much time would we save?"

"We'll probably save about five days by doing this. Because this, deviates from the standard practices for installing power lines, you will have to provide me with written direction to run the power to the instrument pads through chases on the surface of the ground. This is considered a safety item. I was told that I was to do whatever you wanted because you are responsible for getting all of facilities completed. Are you willing to do this?"

"Yes, as soon as I get back to my office, I will provide you with written direction on how the power lines are to be run to the eight small rocket pads. This will relieve you of all responsibility for any damage or injury which may result from running the power lines on the surface of the ground."

I left the H&N office and walked a short distance to the building where I saw the sign: "U.S. Army Ballistic Missile Agency." I entered the office, removed my cap and walked to Doctor Debus' desk. When Doctor Debus and I were alone, we called each other by our first names; otherwise, we called each other by our official titles. Upon seeing me, Doctor Debus said, smiling, "Sit down, Bud. As usual I presume that you have some problems that you need to discuss with me. Am I correct?"

"Yes, Kurt, as usual you are correct. As you remember, it took four months to get the rocket launching facilities on Bikini Atoll ready for the two shots. My best estimate is that the launch facilities can be completed within about 2 ½ months for the first shot, '**TEAK**'. I feel that this will

ensure that we will get the two shots, "**TEAK**" and "**ORANGE**", launched before any moratorium date."

Then I continued on and explained to Doctor Debus what Mike Benson, (H&N) and I had planned to do to decrease construction time to 2 ½ months. Doctor Debus told me that he had no objection to our proposed plan. He felt that the Redstone Rocket will be in place for a very short period of time before it is launched, and therefore, the absence of some metal siding on levels **0**, **3**, **5** and **6** will not have any deleterious effects on the Redstone Rocket."

Based upon the plan of Mike and myself, Doctor Debus and I felt that we could schedule the "**TEAK**" Shot for July 31, 1958 and the Orange Shot on August 11, 1958. We both realized that the schedule is based upon many uncertainties and presently unknown delivery dates. However we felt that with established dates, everyone will have a goal to work towards.

After I left Doctor Debus office, I went to see Mike and told him that I had Doctor Debus' concurrence on our plan; so now he could proceed with the implementation of our plan. When I returned to the WET office, Petty Officer Jones said that Colonel Jamison had called and said, ''the Brigadier General would like to meet with you as soon as possible at his quarters. He did not mention why he wanted to see you." I knew that the living quarters for the Brigadier General Dawson and Colonel Jamison also served as their office. It was one of the best homes on the Island. I had never met Brigadier General Dawson at this point in time; so, as I left the office and as I was driving to his quarters, I tried to contemplate why General Dawson wanted to talk to me. I parked my Jeep and went around the side of the house. From there, I could see the patio, and General Dawson and his Chief of Staff, Colonel Jamison, sitting at a round table on the patio. As I approached near to these two officers, I stopped and saluted. The two officers returned the salute even though they weren't covered. They were following the customs of the Army. I said, "I am Lieutenant Vance, U.S. Navy, Civil Engineer Corps and I am the Requirements Officer for Weapons Effects Test. I'm reporting to you as requested."

Brigadier General Dawson said, "Please sit down in that chair and make yourself comfortable. I understand that you are responsible for making sure that all of the physical requirements are completed in time to get two shots off before any moratorium date is established on all aboveground nuclear testing."

"Yes, Sir! My mission is to do just that."

"I hope you realize that if we do not get these two shots off before the moratorium test ban date is established, your career and my career will be in jeopardy. I was expecting that you would be a more Senior Officer to handle all these complex physical requirements. You are just a Lieutenant in the Navy, and you look too young to be responsible for all these requirements. You look more like a young Ensign. Therefore I would appreciate it if you give me a little background on your schooling and experiences."

"I graduated from the Naval Academy. Later the Navy sent me to Rensselaer Polytechnic Institute get a degree in Civil Engineering, and then some years later the Navy sent me to the University of Illinois to get a Masters Degree in Civil Engineering. I was sent to the University of Illinois study under Dr. Nathan Newmark because he had developed structural dynamics criteria and methods for designing structures to resist the effects of nuclear weapons. My specialty was designing structures to resist the effects of nuclear weapons."

"What has been your experience relating to nuclear operations?"

"After receiving a Masters Degree in Civil Engineering from the University of Illinois, I received orders to report the Weapons Effects Testing in Albuquerque, New Mexico. I was assistant to Lieutenant Colonel Mowery, U.S. Army, who was Head of the Requirements Branch, Weapons Effects Testing. When all the plans were complete in January 1957 for the nuclear testing programs at the Mercury, Nevada test site, Lieutenant Colonel Mowery and I went to the Mercury Nevada test site to handle all of the physical requirements. So, I've seen about 10 nuclear explosions. Then the last of April 1958, I had all of the Rocket facilities about 95% completed on Bikini Atoll so that the two shots could be fired. The construction took four months.

But as you know, a determination was made to change the location of the launch site for the two shots to Johnston Island because no one predict with great accuracy exactly what the phenomena would be when the explosion occurred, which would be at night. Therefore all the Bikini facilities, which were movable, have been dismantled and are being shipped to Johnston Island."

"You've convinced me that your well-qualified for your assigned mission. Also when do you think that you can get the facilities ready for shooting the first shot, '**TEAK**'."

"Doctor Debus, Mike Benson, and I have developed a proposed schedule. Under this proposed schedule, '**TEAK**' Rocket will be launched on July 31, 1958 and '**ORANGE**' rocket will be launched on 11 August 1958. We feel that this schedule will ensure that we will be able to get the two shots off before any moratorium test ban date can be established."

"This means that you're going to have all of facilities ready in 2 ½ months in lieu of four months? Do you really think that you can do all of this in 2 ½ months? I would like to know some of the things that you're doing to reduce the construction time so greatly."

At this point, I explained to the Brigadier General all of the things that Dr. Debus, Mike Benson and I have proposed for decreasing the concrete construction time. "We feel confident that all the facilities can be completed in 2 ½ months."

"Well, I want you to do whatever is necessary to get the facilities completed in accordance with the schedule you have presented to me. There is only about one officer on the Island who is

senior to you, but he is not in your chain of command. If any senior officer tries to pull rank on you, and wants you to do something that, in your estimation, will delay the project, just give me a call, and I'll take care of the problem for you. I'll back you 100%."

"General, you're backing me on this project is greatly appreciated. I'll keep you posted on how the schedule is going and if there are any problems."

I saluted Brigadier General Dawson and Col. Jamison, who returned the salute. Then I left, returned to my Jeep, and then drove back to the WET office.

My mission was to get the facilities built as fast as possible so that two high altitude shots could be accomplished before any upcoming moratorium on above ground nuclear testing. This will be a first time for setting off a nuclear device (we called it a "***Gadget***") at such high altitudes; so, no one really knows what the phenomena would be when the explosion occurs.

At the beginning of the construction phase, I was slowed down for a week. A boil developed on my foot; consequently, my foot and leg began to swell because of the infection. I was put in a bed in the dispensary. The doctor gave me some antibiotics, and he said, "If the swelling does not go down in two days, I will have to send you to the hospital in Hawaii."

After two days the swelling of my leg began to subside. The doctor smiled at me and with a twinkle in his eye said, "I am taking an Algebra Course, and I have solved all the problems for the course except four problems which I have not been able to solve. If you will solve these four problems for me, I will release you early from the dispensary because I know that it has been difficult for you to run the construction from this bed." I solved all four problems that day; so, he released me the next day. The doctor said, "Drop by and see me every day for the next five days to I can check your leg and foot."

It was Wednesday, May 20, 1958. Mike Benson (H&N) walked to my office and said, "We have received a 35-ton liquid oxygen storage tank, four 9- ton liquid oxygen storage and transporting trailers, two 5 – ton/day liquid oxygen plant trailers, an alcohol semi-trailer which has a 3000-gallon tank, and a small 5000 psi compressor trailer. I can put the compressor trailer in one of my storage building, but my question to you is where do you want me to place all these other items on the Island? You know there isn't any spare space on this Island."

"Because liquid oxygen is involved, these trailers must be placed as far as possible from any building; so, the best place would be to put them at the end of the road which runs north from the proposed site of the rocket control bunker to the ocean. This small piece of the Island has a right triangle shape with the ocean on two sides. The last part of the road runs adjacent to the ocean."

"I have no trouble putting all the semi-trailers at that location, but I think you should reconsider putting the 3000-gallon alcohol semi-trailer someplace else. Having liquid oxygen and alcohol in close proximity can be very dangerous. I'm sure that you're aware of this. "

"There is no danger involved because the semi-trailer with the 3000-gallon alcohol tank will be empty while at this location.

"Of course, we will have to run power to these trailer sites, but in order to get the required power to the trailer sites, we will have to cut across the aircraft taxiway and bury a 4"- or 6"-inch chase pipe. Then we can run our power cable through this chase pipe and provide power to the liquid oxygen trailer plants. Before this work can be done, you'll have to contact Air Force Major Devlin and obtain his concurrence on any schedule that we propose. He has jurisdiction over the taxiways."

"I'll work out the schedule with Major Devlin, and let you know when the work can be performed."

"Also within the next few days, a shipment of sixty - 55-gallon alcohol drums will be arriving; so my question is where do you want these alcohol drums to be placed?"

"South of and about 1000 feet from the beginning of the runway, there is a part of the Island that extends from the east edge of the runway to about 200 feet into the ocean, and this strip of land is about 1000 feet long. In this area is the storage for the lube oil and for about four other storage tanks. There is sufficient room in this area for the 60-55-gallon alcohol drums. This will be a convenient area because on the day of each shot, the 3000-gallon alcohol tank trailer can be parked on the runway, and then the tank can be filled easily by pumping the alcohol from the 55-gallon alcohol drums into the alcohol tank on the semi-trailer. Of course, at this time special water will be added to the 3000-gallon tank until there is a 75% alcohol and 25% water mixture".

"I'm also told that there are two- 78-gallon drums of concentrated hydrogen peroxide that will be arriving soon. Where do you want me to store these drums?"

"You can place these two drums of hydrogen peroxide in one of your normal storage building. Just make sure that they're not stored where they will be exposed to any sun light. The ideal temperature for the hydrogen peroxide is 75°."

"Bud, you have answered all my questions." Then Mike Benson left the office. Petty Officer Jones then said, "What is the hydrogen peroxide used for in connection with the Redstone Rocket?"

"The Redstone Rocket consists of a **Thrust Unit**, and **Aft Unit**, and a **Nose Unit** which contains the "***Gadget***." There is a 72-gallon hydrogen peroxide tank located at the top of the **Thrust Unit** of the Redstone Rocket and such is pressurized. When the feed valve is opened, hydrogen peroxide flows to a steam generator containing potassium permanganate pellets. Upon hitting the bed of pellets, the hydrogen peroxide undergoes a process known as catalytic conversion, and is instantly converted into superheated steam. This steam rotates the turbo pumps which controls the flow of alcohol and liquid oxygen to the combustion chamber. Any further question on purpose of the hydrogen peroxide? "

"No. I understand the purpose of the hydrogen peroxide. Now for my second question. In

talking to others, I have learned a plane loaded with 1,500 pounds of dry ice will arrive on Johnston Island before the shot. What is the purpose of all of this dry ice?"

"1,500 pounds of dry ice will be shipped in 1-ton containers. The dry ice in the containers will be one-inch cubes and will be in 50-pound insulated bags. Electronic equipment in the Rocket guidance system compartment of the **Aft Unit** generates a lot of heat; so there must be a cooling mechanism for controlling the temperature. At the launch site, cubes of dry ice are placed in the inner cooler of the guidance system compartment and in an external drop tank. Both tanks are filled to capacity with about 18 pounds of dry ice in the inner cooler and about 150 pounds of dry ice in the external drop tank. At ignition time, the external dry ice drop tank is ejected from the side of the guidance compartment by the firing of two igniter squibs at its attachment points on the Rocket. So, in essence, the dry ice is for cooling and controlling the temperature in the rocket guidance system compartment in the **Aft Unit**. Do you have any questions on my explanation of the use of the dry ice (Carbon Dioxide) for the Rocket?"

"No. I have no further questions concerning the dry ice."
"I hope that you don't mind my asking you one more question?"
"Not at all."

"Why is water added to the alcohol tank to obtain a mixture of 75% alcohol and 25% water?"

"The 25% water content of the fuel reduces the flame temperature so that the engine (turbo pump blades) will not melt and adds to the weight and pressure of the gases expelled, thus contributing to the thrust."

"Right now I do not have any more questions."

After about one hour, the phone rang. Petty Officer Jones picked up the phone and said, "WET Office. Petty Officer Jones speaking." Petty officer Jones listened to the person on the other end of the line, and then said, "Lieutenant Vance is in his office, and he will be here for the rest of the morning. I will tell him that you will be coming to see him within the next 15 min."

Then Petty Officer Jones hung up the phone, and said, "Mr. Strickland, the Safety Officer, the Atomic Energy Commission (AEC), said that he was coming over to talk to you about a possible safety violation."

"I know Mr. Strickland. He is a civilian employee of the AEC who is about 60 years old and who feels that his duty in life is to ensure that all work conforms with all safety regulations and requirements. Did he say what the safety violation was?"

"No, he did not mention what the possible safety violation was."

After 15 minutes had passed, Mr. Ken Strickland entered the WET office. He is about 6 foot tall, and has gray hair.

I stood up and pleasantly said,"Nice to see you again. Please sit down."

Mr. Strickland sat down in the chair beside my desk. Then he said, "How much liquid oxygen will be produced using those two-liquid oxygen (LOX) plants?"

"A total of 36,000 pounds of liquid oxygen (LOX). The nominal Rocket capacity is 25,000 pounds. The remaining 11,000 pounds is used to cool down the Rocket tank prior to loading and to top off the Rocket tank prior to the launch."

"Based on the quantity of 36,000 pounds, the semi- trailers must be at least 230 feet from any building. In order to meet this criteria, you will have to move your trailer park 100 feet to the Northwest."

"If I moved the trailer park 100 feet to the Northwest, the trailer park would be 100 feet out in the ocean; so the trailer park just cannot be moved. There is no other acceptable place on the Island that can meet the safety requirements."

"As Safety Officer, I am giving you official notice that you are in violation of the AEC safety regulations. If there is a fire resulting from the production of liquid oxygen at your LOX trailer park and buildings are damaged or destroyed, you'll be subject to a Navy Court-Martial, **especially if there is a loss of life**. At such court-martial, I would be required to testify that you were fully aware of this violation of the AEC safety regulations and that you did nothing to correct the safety violation. Such a court-martial would end your career as a Naval Officer. You should keep this in mind when you try to figure out how to solve this big safety violation problem."

Then Mr. Strickland arose and left the office.
Petty Officer Jones pushed his desk chair back, stood up and walked to my desk. Then he said, "What are you going to do to solve the problem without delaying the launch date and ending your Naval career?"

BUD'S MEMORIES OF EXPERIENCES
ON
OPERATION HARDTACK

PART 3

"First of all, there is no other place on the Island to put the LOX trailer park; so, the only thing that I can do to reduce my risk of liability is to install a fire sprinkler system above all of the trailers before the production of any liquid oxygen. I know that the sprinkler system will subdue any equipment fire, and hopefully keep any liquid oxygen from igniting. However, if the liquid oxygen catches on fire, the sprinkler system will not be of much use. Also I realize that this will require cutting the taxiway and burying a power chase conduit and a water chase conduit under the taxiway for installing a power line and a fire line to the LOX trailer park."

"Who is going to design the overhead sprinkler system?"

"The design will be made partly by us and partly by Homes and Narver. What I want you to do is to go out to the LOX trailer park and measure the area which has to be covered by the fire sprinkler heads. Then based upon each fire sprinkler head covering 90 ft.², I want you to figure out how many sprinkler heads are required to cover the area and then plot them out on a drawing. Make a note on your drawing to indicate that each sprinkler head will put out 40 gallons or more of water per minute Then when you have completed your drawing, I will give it to Mike Benson, and he can transmit the information to the Homes and Narver Engineering Office in the United States, which will determine the size of each water line to each fire sprinkler head and also the size of the fire main line which will be required to feed all of the sprinkler heads."

"I will have those drawings ready for you by tomorrow morning."

I called Mike Benson and said, "Tomorrow I will show you a layout drawing for the sprinkler system. I want H&N to complete the sprinkler design to determine the size of pipes for each sprinkler head and the size of the fire line to provide the water for the sprinkler heads."

"My home office can have the sprinkler system designed in three days."

"Also, Mike, because of the location of the (LOX) trailer Park, we will have to run a high voltage cable across the taxiway, but this cable will have to be buried. We will have to cut about a 12-inch-wide trench across the asphalt taxiway, bury the electrical chase conduit, partially backfill the trench with sand and base rock and then finish the backfill with asphalt. The power cable has to run to the other side of the taxiway to provide power to the trailers which manufactures the liquid oxygen which is the major fuel for the Redstone Rocket.

Also, we will have to cut about an 18-inch trench across the asphalt taxiway, bury a water chase conduit, and backfill the same as for the power chase conduit. The water line through this chase will also provide water to the fire sprinkler system. I want you to schedule this work for Friday May 23, 1958. How long do you think it will take you to perform this work?"

"The work you describe will take about six hours. I will put this work on my schedule for Friday. Of course, you realize that you will have to get Major Devlin's permission to cut across the taxiway on this Friday."

"I am sure that I will be able to get the permission of Major Devlin to perform the work."

At 1500 hrs., on May 20, I picked up the phone and dialed the office in the Air Field Control Tower.

"This is the Airfield Control Tower Office, Air Force Master Sgt. Russell speaking."

"This is Lieutenant Vance. I would like to speak to Major Devlin."

"Major Devlin is off the Island at this time, and he will not return until Thursday morning, May 22nd. Would you like to leave major Devlin a message?"

"Yes, but first I need to know if there will be any arriving or departing flights on Friday, May 23, Saturday, May 24, and on Sunday, May 25."

"There are no flights scheduled to arrive or depart on any of those three days. However starting on Monday, we will have numerous flights arriving in the morning and the afternoon for the next three or four weeks."

"On Friday afternoon, May 23rd, I am scheduling Homes and Narver to make two cuts across the taxiway to install a water chase conduit and a power chase conduit for getting water and power to the liquid oxygen trailer park. The digging, the placing of the chase pipes, and the backfilling of the trenches will take approximately 6 hours. Please give this information to Major Devlin. If he has any problem with this construction operation, he can call me or come and see me."

"I'll give Major Devlin your message as soon as he returns to Johnston Island."

I hung up the phone and started reviewing all the messages which I had received. Petty Officer Jones spent the rest the day in the field checking on the forming for the concrete pours.

On Thursday afternoon, May 22, 1958, the phone rang and Navy Petty Officer Jones answered and said, "WET Office, Petty Officer Jones speaking."

The person on the other end of the line said, “This is Air Force Master Sgt. Russell. I just called to give you a ‘heads up’ that Major Devlin will be coming to see Lieutenant Vance in about 15 minutes Major Devlin has steam coming out of both of his ears.”

Petty Officer Jones responded, “Thanks very much for me giving me a ‘heads up’.”

Then Petty Officer Jones said, “Lieutenant Vance, Major Devlin will be coming to see in about 15 min, and from what I understand, he is very upset that you’re even thinking about tearing up his taxiway.”

Then I said to Petty Officer Jones, “When the Major comes, I would like you to stay at your desk and listen in on the conversation so that you can be my witness as to what was said.”

“I will be at my desk with my eyes wide open and my ears tuned to every word spoken.”

After 15 minutes had passed, Major Devlin opened the door to the WET office, entered, and stuff his overseas cap under his belt and walked towards me. At this time I rose from my chair and stood facing the Major Devlin. I did not salute because I did not have my cap on. I could easily discern by the look on Major Devlin’s face that the Major was really upset and disturbed.

I said, “Good to see a Major. Please sit down,”

Major Devlin had a scowl on his face, and spoke in a very sarcastic tone, “I don’t need to sit down because I’m not going to be here very long! I came here to tell you that you’re not going to tear up my taxiway because I need the taxiway to remain operational at all times to handle all flights and emergencies! The taxiway is under my jurisdiction, and therefore, I’m ordering you not to tear up the taxiways this coming Friday! Is that clear! Just remember that I outrank you!”

I calmly and pleasantly said, “First of all, I am not going to actually tear up the taxiway. On Friday I plan to cut a trench about one foot wide to bury a chase conduit for a power line, and about 10 feet horizontally from this cut, I plan to cut about an 18-inch-wide trench to bury a chase conduit for a water fire line. These trenches will be dug about 4 feet deep, and then the trenches will be backfilled, compacted and covered with asphalt. This will take about six hours. According to your office, there will be no planes using the taxiway this Friday, Saturday or Sunday. By Saturday evening the asphalt will be cured sufficiently to handle planes on the taxiway. However, if during the interim, there is an aircraft emergency, we can always put metal plates over the asphalt where the cuts were made so that the taxiway can be used by an aircraft. I have to get power and water to the (LOX) trailers so that liquid oxygen can be produced for the Redstone Rocket. No liquid oxygen! No shots! I hope that I will have your cooperation in installing those two chases. If not, then my only alternative is to call General Dawson and to tell him that you are trying to prevent me from getting power and water to the LOX trailers so that liquid oxygen for the Redstone Rocket can be produced. General Dawson has charged me with doing whatever is necessary to fulfill all

the necessary requirements so that two shots can be fired before any moratorium date on above ground nuclear testing is established. For the sake of your career, I don't think you want to make General Dawson unhappy by trying to prevent the two shots from being launched."

The expression on Major Devlin's face changed because he now realized that these two chases have to be put in for the production of liquid oxygen, and that if he tries to prevent the chases from being installed, he would jeopardize his career. Major Devlin said,"Since you're not actually tearing up the taxiway, I have no objection to your installing the two chases on Friday May 23rd. Just make sure that you are completed within those six hours on Friday afternoon!"

After saying this, Major Devlin angrily pulled his cap out from under his belt, put on his cap, and left.

I picked up the phone and dialed Mike Benson. Mike answered the phone, "Homes and Narver, Mike speaking."

"Mike, this is Bud. I talked to Major Devlin, and he stated that it was all right for us to cut the taxi way and install the two chases for the power and the water on Friday afternoon May 23rd. I promised Major Devlin that we could do the work in a six-hour period. So, you are 'good to go' on Friday afternoon. Also within the next 5 min., Petty Office Jones will bring to you the drawing which shows where the trenches are to be cut across the taxiway, and also the layout for the sprinkler heads for the Liquid Oxygen Park. Then you can get your Engineering Office in California to finish the design of the fire sprinkler system for the LOX trailer Park."

On the afternoon of Friday, May 23, I walked to the taxiway where the trenches were to be excavated and was greeted by John Lawrence, H&N Construction Foreman. He said, "I have enough equipment and men to work both excavation sites simultaneously; so we should be able to finish within the six-hour time limit."

I was standing back out of the way because I didn't want to interfere with all the work that was underway. At this time Master Sgt. Jim Russell arrived on site and walked over to me. Then he said, "Lieutenant Vance, Major Devlin sent me to observe the operation and report back to him. Major Devlin thinks that the work should take only three hours or less. He feels that six hours is just too long. In his view, he feels that you people really don't know what you're doing or are probably incompetent and that is why you need 6 hours to do the work. So I'm here just to observe. I really don't know why he sent me because I know nothing about construction work; so I hope that you won't mind my asking questions."

"Please feel free to ask any question at any time."

H&N personnel started the first cutting of the asphalt at both excavation sites with about a 3-foot diameter blade. The length of each cut would be approximately 150 feet. After fifteen

minutes of watching the cutting of the asphalt, Master Sergeant Russell's said to me, "I noticed that the cutting machine sprays water on the cutting blade. What is the purpose of this water?"

"The water serves two purposes. One purpose of the water is to keep the cutting blade cool because there's a lot of heat generated by friction during the cutting process, and the second purpose is to provide, what we might call, some lubrication for the cutting blade."

After one hour, the crews were well underway making the second cuts. Right behind cutting crew, backhoes at each excavation site started removing the asphalt between the two saw cuts and then loading the asphalt into trucks.

Master Sergeant Russell said, "It has taken you so long to saw cut the asphalt that I'm concerned that you will not finish on time."

"We will finish on time. The saw cutting is always a slow process."

After the asphalt was removed, Jim could see the base rock material which was underneath the asphalt. Then Jim noticed were about a number of H&N men walking at each site on the base rock with thin metal rods. At intervals they were pushing the metal rods down into the base rock material. Behind them, the backhoe was excavating the base rock

"Lieutenant, what in the world are those men doing with those thin metal rods?"

"They are pushing the rods down into the base rock material to try to locate any buried utilities, such water lines, power lines, signal lines, sewer lines, etc. We do not want to break any buried lines, especially a fire water line or power line. Under normal circumstances, we would have drawings which shows where all the utilities are buried, even those under the taxiway. Then the metal probes would be used to determine the depth of any of the utilities shown on the drawings. Unfortunately utility drawings do not exist; so we have no idea what utilities might be buried in the taxiway. The only way we can determine if any utilities are in the path of the excavation is to probe at small intervals. Breaking a water line would be disastrous because the excavated site would be flooded, and about five or six more hours would be added to the completion. "

"This helps me to understand why you have so many people probing with those steel rods."

The H&N personnel used the backhoes to remove the base rock underneath the asphalt to the required depth. Then they placed about 4" of sand in the bottom of each trench, and then placed a chase in each trench. Each chase was moved back and forth with a little horizontal and vertical pressure.

"Lieutenant, why is sand being put in the bottom of the excavation?"

"The sand is called a bedding material and provides an easy means of laying the chase pipe

level and providing uniform supported throughout the 150 feet."

"I noticed that they're putting more sand over the top of the chase pipe. Why is this being done?"

"More sand is poured over the chase pipe and compacted. This will protect chase pipe from any small rocks in the base material."

H&N personnel operating the front-end loaders/backhoes placed new base rock, to a depth of about 8 inches. which was sprayed with water, Then H&N personnel started compacting the base rock.

"It seems to me that it would be much faster to fill excavated trench with base rock material at one time instead of doing it in 8-inch lifts. A lot of water would be saved if they didn't spray the base rock. All this seems like a waste of time and water."

"First of all, base rock must have a certain moisture content so as to be able to compact to a minimum of or greater than 95% compaction. Just enough water is added to achieve the proper water content. Also, achieving an almost 100% compaction throughout the base rock can only be accomplished when the depth of the base rock to be compacted is approximately 8 inches."

Homes and Narver personnel finished placing the base rock and started filling the top part of the excavation with hot mix asphaltic concrete. The asphalt was placed in a four-inch lifts and compacted.

"Lieutenant, why aren't they putting the asphalt in an 8-inch lifts or greater."

"In order to obtain maximum compaction for asphalt in this case, it should be placed normally in about four-inch lifts. After the last lift of the asphalt is placed, H&N personnel will drive large rollers with a vibrating drum over the backfilled areas to ensure that the asphalt in these areas are level with the asphalt of the rest of the taxiway. Therefore the taxiway will be as smooth and solid as it was before the excavation took place. "

H&N personnel finished all of their work in a little less than six hours, and Master Sgt. Jim Russell was getting ready to leave. The Master Sergeant said to me, "Well, now I can go back and tell major Devlin why it took six hours to complete the work and assure him that you people are not incompetent and that you really know what you're doing."

"Russell, I want you to know that after about six hours vehicles can run over the new backfilled areas in the taxiway. However, I recommend that no planes use the taxiway until Saturday evening because by that time the asphalt should be sufficiently cured. Anytime you have any questions, please give me a call."

Master Sergeant Russell returned to the Air Traffic Control Center, and I returned to my office.

On Saturday May 24th Petty Officer Jones and I went to the construction site to watch H&N personnel start the grading of the construction site so that the concrete forming work can start next week.

On Tuesday morning, May 27th, Mike Benson and I met with Doctor Debus who wanted to discuss the arrival of the Rockets. When we met, I said, "Before we discuss the arrival of the Rockets, I would like to inform you that the tower will be erected and finished on June 20, and your Rocket Control Bunker will be completed on June 28, as scheduled." Doctor Debus said, "I am very glad to hear that we are on schedule. I would like both of you to come to this meeting so that we could discuss the arrival schedule for the **Thrust Unit** of the **Rocket 50**, which is for the **'TEAK'** Shot, and for the **Thrust Unit** for **Rocket 51** which is for the **"ORANGE"** Shot**.** Each **Thrust Unit** is scheduled to arrive on July 2 via a C-124 aircraft. The **Thrust Unit** of each Rocket will be on a semi-trailer; so each can easily be transported to a storage area. I will provide from my group the drivers for these semi-trailers Although the **Thrust Units** will be covered with a tarp, I would prefer that they be stored inside."

Mike said, "How long is each **Thrust Unit**?"

I immediately answered and said, "Each **Thrust Unit** is 41' - 4" long."

Somewhat astonished, Dr. Debus said, "Bud, I can plainly see that you've done your homework and that you're very knowledgeable about the specifications of the Redstone Rocket." I replied, "Yes, I am. I felt that I should know as much as possible
about the Redstone Rocket since the success of the project depends on this Rocket and you." Mike said, "I have one warehouse that **is** large enough to store both of the **Thrust Units**."

Dr. Debus continued, "The other parts of the Rockets, that is the **Nose Unit**, which contains the Nuclear Gadget, and the **Aft Unit**, which houses the guidance and control components, will be mated in Hawaii. After the **Nose Unit** and the **Aft Unit** for each Rocket are mated in Hawaii, then such mated units will hereafter will be referred to as the **Body Unit**. The two **Body Units** will be shipped by plane to Johnston Island on July 12. These **Body Units** will be on semi-trailers. As soon as the **Body Unit** for **Rocket 50** arrives, my people will mate the **Body Unit** with the **Thrust Unit** using six bolts which contain internal explosive charges. Then Rocket **50** will be hoisted up and placed on the XM74 metal launcher on the launch pad. Mike, I will need you to provide your crane with the 150-foot boom and with an operator for the mating, hoisting, and placing of **Rocket 50** on the metal launcher ring."

I said, "The **Body Unit** for **Rocket 51**, which is for the **'ORANGE'** Shot, will have to be placed in storage. The **Body Unit** is 28 feet long. I would recommend that you place this **Body Unit** in a smaller and separate storage area from the **Thrust Unit** for **Rocket 51.** When the **Body**

Unit for **Rocket 51** is stored, a Marine guard must be placed at the entrance of the storage area to prevent any unauthorized persons from entering because of the Nuclear Gadget which is the in the **Body Unit**."

Mike said, "I have a smaller storage building available in which the **Body Unit** for **Rocket** 51 can be placed."

Then Dr. Debus stated, "This is all of the information that I have to give to you at this time. I'll keep you posted if there's any change in the schedule for the delivery of the Rocket Units "

During the first two weeks of June (2 to 7 June and 9 to 14 June) all of the concrete pours were completed as scheduled. The concrete pour included the walls and the roof of the Rocket Control Center Bunker. During the end of the two weeks, H&N installed the XM74, the metal Rocket launcher mechanism on the Rocket launcher pad. The Redstone Rocket will sit on this metal launcher mechanism which is used to orient the Redstone Rocket vertically and to align the selected reference fins toward the proper direction.

On 16 June at 1500 hrs., Dr. Debus, Mike Benson, Petty Officer Jones and I stood near the Rocket launching pad to view the start of the erection of the Rocket Tower. This area is near the North end of the runway, and is between the runway and the taxiway. We watched as the huge H&N Crane hoisted the base of the Rocket Tower and set it on the iron railroad rails on the Rocket Launching Pad. At each end of the Tower base were two sets of railroad wheels. These four steel wheels will be driven by the installed electric motors. Once the wheels of the tower base were on iron rails and locked in place, the crane began hoisting the major structural members of the Tower. At this time I said to Mike Benson, "I just want to remind you that skin or siding for the tower will be placed only around levels 1,3, and 4." Mr. Benson responded, "My Rocket Tower foreman is well aware that only these three levels are to be covered the siding."

During June 16 to June 20, Dr. Debus, Mike Benson, Petty Officer Jones and I periodically went to the site to observe the erection of the Rocket Tower. The erection of the Rocket Tower proceeded as scheduled. Also on June 19, H&N personnel started removing the concrete forms on the Rocket Control Bunker and such work was completed on June 20. June 21, the Rocket Tower was completed. At 0800 hrs. Dr. Debus, Mike Benson, John Lawrence, the H&N tower foreman, Petty Officer Jones, and I were at the Rocket launching site to inspect the Tower. We entered the elevator which was about five feet wide by nine feet long. John, the H&N Rocket Tower Foreman, operated the elevator's control lever and took the group to the level 1. He opened the wire mesh door of the elevator and then opened the wire mesh platform door. When all of us returned to the elevator, John took us to levels 3, and 4. Then John took the us to level 5 and opened the elevator door and the platform door so that we could go out onto the platform level. John said, "Be careful because there is a 7-foot opening in the center where the Redstone Rocket will eventually reside. There is no safety line around the opening; so please do not go close to the edge of the platform. Above platform five, there is another platform which we call number 6. To get to this platform one has to climb a metal ladder. At this level of the tower are the elevator motors and controls. There

is more frame work above level 6. The Rocket Tower is approximately 100 feet high."

After inspecting the Tower, we departed the elevator and stood at the side of the tower so that John could show how the Tower is moved. There was a long power cable connected to a nearby concrete fire revetment, and the other end of this cable ran to the Tower electrical service panel. Also connected to a smaller tower electrical service panel was a small electric cable about 15 feet long and was connected to a control box. This box controls the movement of the Rocket Tower in the forward or reverse direction.

John handed to Lieutenant Vance the Control Box and said, "The black button on this control box is the brake button. When this black button is depressed, the brakes on the four wheels of the Tower are activated. The green button moves the Tower in the forward direction. The red button moves the tower in the reverse direction. Are you ready to try to move the Tower to the Tower pad?"

I took the Control Box and practiced moving the Tower forward and then in reverse a number of times to get the feel as to how fast the Tower moves and how quickly the Tower stops without energizing the brakes. I pushed the black button a number of times to see how quickly the brakes would stop the Tower. I was fully aware that I would be responsible for moving the Tower from the Tower Storage Pad to the Rocket Launch Pad and around the Redstone Rocket which would be a critical operation because there's only a 6-inch clearance between the platforms and the Rocket which is 70 feet tall. I moved the tower approximately 75 feet from the Rocket Launch Pad.

I said, "John, the Tower Storage Pad is approximately 150 feet from the Rocket Launching Pad. I estimate that the power cable connected from the Tower to the Fire Revetment is only about 80 feet long. So, I can only move the Tower about 75 feet away from the Rocket Launching Pad. What do I have to do to be able to move the Tower the rest of the way to the Tower Storage Pad? "

"When the Tower has moved approximately 75 feet from the Rocket Launching Pad, you will have to send someone to go to the Fire Revetment and unplug the power cable. Then drag the power cable to the Tower Storage Pad and plug it in to the power outlet at the Pad."

Then I asked Petty Officer Jones to remove the power cable from the Fire Revetment power outlet and drag the power cable to the Tower Storage Pad and plug it into a power outlet at the Tower Storage Pad. Then I used the Control Box to move the Tower to the Tower Storage Pad where it will stay until the Redstone **Rocket 50** is placed on the Rocket Launching Pad. Then I said, "Jones, I would like you to put two curved chocks at each wheel and make sure that the chocks are securely clamped to the railroad rails. This will make sure that the Tower is not going to move as a result of any strong wind."

Jones said,"Yes Sir. I'll have all of chocks in place within the next half hour."

Then I turned to Doctor Debus said, "So far, we are still on schedule; so the Rocket Control Bunker will be available to you on Saturday, June 28

Later in the day, I went to the communication building and sent my construction status report to Lieutenant Colonel Mowery, my boss, on Eniwetok Atoll.

As soon as I entered the office the next day, June 22, Petty Officer Jones said, "Sam, from the Communication Center called and said that you are to go to the Communication Center because Lieutenant Colonel Mowery wants to talk to you by the radio communications which is established between Eniwetok Atoll and Johnston Island. The subject of discussion will be the progress construction schedule which you recently sent to him."

I left my office and drove my Jeep to the Communication Center. After I entered, I went to the information desk. I was aware immediately that this center was air conditioned because the center was so cool and pleasant inside. It had to be air conditioned to dissipate all the heat generated by the radio communication equipment. I said to the male civilian behind information desk, "I am Lieutenant Vance and I came over here to see a person by the name of Sam."

The male civilian called out, "Hey, Sam, Lieutenant Vance is here to see you."
Sam, a civilian in his early 30s, walked to me and said," I am Sam. Welcome to the Communication Center. Lieutenant Colonel Mowery has been trying to get in touch with you. I'm going to take you over to that desk where there is a phone which you can use to you talk to Lieutenant Colonel Mowery."

We both walked over to this desk, and I sat down. I noticed that there was a phone on the desk and also the pad of paper and a pencil. Sam walked over to the radio communication console. Sam said, "Lieutenant, you'll have to wait a little while I make radio contact with the communication center at the Eniwetok Atoll and get Lieut. Lieutenant Colonel Mowery on the radio. Once he is on the line, you can pick up the telephone and talk to him just as you would if you had dialed him using a land line telephone."

After about five minutes, Sam said, "Lieutenant Vance, you can now pick up the phone and talk to Lieutenant Colonel Mowery."

I picked up the phone and said, "Bill, this is Bud. I understand that you wanted to talk to me about the Construction Schedule which I sent to you. Is this correct?"

"Yes, those in the high command had estimated that the first shot could not be earlier than Monday, September 15 and the second shot could not be earlier than Monday, September 26. This is based upon the construction time that it took to get all of the Rocket launching facilities ready on the Bikini Atoll. So they cannot believe that Dr. Debus and you have scheduled the first shot for Thursday, July 31 and the second shot for Monday, August 11. They are convinced that you are sending overly optimistic and not realistic reports. Because of this, they are even thinking about

sending someone to Johnston Island to verify that your Construction Schedule is reasonable accurate and realistic. I know that all of the reports that you have submitted on previous projects have been very complete and accurate."

"Bill, on Saturday, June 28, the Rocket Control Center will be complete and turned over to Dr. Debus. We have shortened the schedule by using 4000 psi concrete in lieu of the standard 3000 psi concrete so that there was sufficient concrete strength within 10 days in lieu of 28 days. Also, we are only putting the skin on the Tower only at levels 1,3, and 4. This was done with Dr. Debus approval. Also, we are running some power lines in conduit on the ground covered with adequate amounts of base rock rather than burying about four feet in the ground. I am assuming the risk for doing this. All of this has saved a great amount of the construction time. I feel that, from a construction standpoint, July 31 is a good date for the first shot and that August 11 is a good date for the second shot. Also Dr. Debus and I feel that July 31 is a reasonable and achievable date for the first launch. If the high command wants to send somebody out to verify Construction Schedule, that is fine with me because he will find that the schedule is as accurate and realistic as possible."

"Well, you've convinced me that your schedule is reasonable accurate and realistic; so I doubt that they'll be sending anybody out to verify the Construction Schedule. Of course, we both realized that in the month of July many unforeseen events can happen that may delay the shot schedule. If you run into any problems, just give me a call and I'll do my best to help you."

"Bill, I appreciate your defending me, and, if I run into a problem that may delay the shot schedule, I will definitely give you a call and ask for your help. You have always been so supportive."

I hung up the phone and thanked Sam for making the connection.

On June 23, I walked to the office of Mike to discuss the Rocket Control Bunker. I sat down in the chair next to Mike's desk and said, "I know that all this coming week you will be working on the interior of the Rocket Control Bunker which is 30 feet wide 30 feet long. Dr. Debus wants a wood stud partition to divide the bunker in half. The half facing the launching pad is to be divided in half by a wood stud partition, forming two cubicles 15' x 15'. Of course the cubicle to the left will have the large blast resistant glass window, so that Dr. Debus will be able to observe the Redstone Rocket before and at launch time. The openings to these two cubicles will be 7 feet high and 4 feet wide. No doors will be attached to these openings.

''This information is also important for your method of installing the air-conditioning. When you are pulling in the signal wires, be sure to work closely with Dr. Debus' crew. Also check with his crew as to where all of the TV monitors are going to be installed."

"I appreciate the information. Our schedule is still to have the interior of the Rocket Control Bunker completed this week and then turn the Control Bunker over to Dr. Debus on June 28."

After the meeting I returned to my office.

During the week of June 23 through June 27, Petty Officer Jones and I visited the Rocket Control Bunker each day to check on the progress of the work. By June 27, the interior partitions were completed, and the power and signal cables were pulled to their appropriate locations. The lighting, the blast door, the blast resistant glass window, the air conditioning, and the wood covers over the power and signal trenches were installed. Mike Benson, Petty Officer Jones and I were present in the Bunker when all of the electrical outlets, the lighting and the air-conditioning system underwent testing. Based on these tests, the Rocket Control Bunker was ready to be turned over to Dr. Debus.

On June 28, Dr. Debus, Mike Benson, Petty Officer Jones, and I all met at the entrance to Rocket Control Bunker. Petty Officer Jones swung that two rod type levers on the blast door to the open positions and opened the blast door. Then he turned on all of the lights in the Bunker. After all this was done, Petty Officer Jones closed the blast door and moved the two rod type levers to the lower positions, thereby locking the blast door. Once inside, Dr. Debus noticed that all the walls and ceiling had been painted an off-shade white. Dr. Debus said, "I appreciate your painting the interior of the bunker because it makes the interior so bright and provides such an environmentally friendly atmosphere."

Mike said to Doctor Debus," You can thank Bud for the painting because he modified the plans to include the painting."

When the inspection was finished, we returned to our respective offices.

An interesting item.

One time a commercial aircraft, which was heading for Hawaii, had to make an emergency landing at Johnston Island. Before the plane was near Johnston Island, the air line pilots were directed by the General Dawson on Johnston Island to have the passengers pull down the shades on the windows of the aircraft. This was done. When the plane landed and taxied to the parking apron near the hangers, the pilots and passenger were told to leave their cameras aboard the aircraft. When they departed from the plane, they were escorted to the mess hall by armed guards. These armed guards stayed with the passengers in the mess hall. The pilots were taken to a separate room by members of the General's staff, and they were told very forcefully that they should not mention what they had seen on the Island to anyone. When the plane was ready, the passengers were escorted back to the plane by armed guards. The plane flew off the Island with the shades down. Only the pilots had a view of the tower and the other facilities.

When I returned to the WET office, Petty Officer Jones said, " Colonel Jamison called and stated that General Dawson wants to see you right away at his quarters to discuss an urgent matter. Could this be another bad omen? "

BUD'S MEMORIES OF EXPERIENCES
ON
OPERATION HARDTACK

PART 4

''I would appreciate it if you'd call Colonel Jamison and tell him that I'm on my way to see Brigadier General Dawson.''

I walked out the WET office and drove to General Dawson's quarters. As I walked towards the patio, I could see General Dawson and Colonel **Jamison** sitting at a table on the patio. As I approached them, I saluted and said, "Lieutenant Vance reporting as requested."

Brigadier General Dawson said, "Please sit down." I pulled a patio chair out and sat down. Since the sun was shining on the patio, I left my cap on. Then General Dawson continued, "Are you aware that there is a small Island, called Sand Island, just about three quarters of a mile North of Johnston Island?"

"Yes, Sir, I am aware of the existence of Sand Island, but the only thing I know about the Island is that there is a Loran Station on the eastern part of the Island."

"Well, on this small Island there are many, many birds of all varieties. This Island was designated as a bird refuge in 1926. There'll be no shot until we have implemented a means to protect all these birds from the thermal pulse of any high yield ***Gadget*** explosion. I know that you're aware that the ***Gadget*** will have a high yield; therefore, the thermal pulse will be very great and extend over a great distance. I know that you have seen many nuclear explosions when you were at Mercury, Nevada Nuclear Test Site in 1957; so, I presume that you know what to do to protect these birds?"

"Yes, Sir I do! We can set smoke generators on Sand Island that will put out a dense black, non-toxic, smoke that will completely cover all of Sand Island prior to the shot, which is supposed to occur during the night time. The dense black smoke will protect the birds from the thermal pulse. The smoke generators will be electrically started so that we can send a timing signal to start the smoke generators at the appropriate time prior to the shot. After I leave here, I will arrange for the H&N Construction Manager and myself to travel by boat to Sand Island and determine the number of smoke generators which are needed. Once we have determined how many smoke generators are needed, the H&N Home Office in USA will order the smoke generators and have them shipped to Johnston Island by air. The smoke generators will be ordered on a priority basis, and therefore, they be should be available to install by July 10. Therefore the **'TEAK'** Shot should not in any way be delayed because of the requirement to provide protection for the birds."

"I was sure that you would know what to do to protect the birds. Let me know when all of the smoke generators have been installed on Sand Island."

"General, I'll keep you posted on the status of the smoke generators, and inform you when all of smoke generators have been installed."

I saluted and left the patio. I drove back to my office parking space, and walked to the Homes & Narver's office. As I entered the office, I could see Mike Benson sitting at his desk shuffling papers and I walked to over to his desk and sat down on the chair adjacent to the desk. At this time Mike stopped shuffling papers and looked at me. Then he said, "I can tell by the look on your face that you and I have another problem to solve. I presume that you are ready to unload the problem on me?"

"You are correct. I just had a talk with General Dawson, and he said that I had to protect all of birds on Sand Island from the thermal pulse of the nuclear explosion. Until such protection is provided, there will be no **'TEAK'** Shot on July 31. I told General Dawson that we would put smoke generators on Sand Island that would produce a black, non-toxic smoke to protect the birds. The smoke generators must have an electric start so that we can send a signal to the smoke generators in sufficient time to start the generators and cover all the Island with black, non-toxic smoke prior to the launching of **Rocket 50** and **Rocket 51.** Therefore you and I need to obtain a boat and visit Sand Island to determine how many smoke generators will be needed and where they will be placed. There is a Loran Station on Sand Island; so there is power available. How soon do you think you be able to obtain a boat for us?"

"Right away. There is a small H&N boat available at the boat dock. We can use this small boat because there are no large waves which we will encounter since there is a protective submerged coral reef to the northwest of Johnston Island and also a small submerged coral reef north of Johnston Island and to the east of Sand Island. Plus the water between Johnston Island and Sand Island is not very deep. Do you have time to go to Sand Island now?"

"Yes, I do."

The boat dock was not too far away from the office; so Mike and I walked to the dock area where there were a number of small boats. Mike brought with him his distance measuring wheel which had a handle for pushing.

Mike asserted, "This is the boat we are going to take. It has a powerful outboard motor; we should be there in about 10 minutes."

Mike stepped down into the stern of the boat, and I stepped down into the bow of the boat. The both of us slipped into life jackets and I released the bow line. Mike started the engine with one pull of the starter cord and then released the stern line. Mike increased the speed of the engine to the maximum. Because of the submerged coral reefs around Johnston Island and Sand Island,

the surface of the water was smooth, with only very small waves.

Within about 10 minutes, we arrived at the boat dock on Sand Island. I jumped upon the boat dock and secured the bow line then Mike tossed me the stern line, and I secured the stern line to the boat dock. Once the both of us were on the dock, we removed our life jackets and placed them in the boat. While standing on the dock, we both looked over Sand Island, which has two small landmasses connected by a very narrow land mass. The eastern most small landmass contains a Loran Station and electric power. Each of two land masses was about 450' x 450'.

There were a great many birds on the ground, and also many birds were flying in the air. Some of birds flying were noticeably huge.

"Mike, before we venture out, I think that we should look for a few poles because I was told that some of the large birds may dive bomb us because they will consider us as invaders. I was told that there are some poles near the boat docks."

We looked around the dock area and found a couple of poles that looked like old broomsticks handles. We were now appropriately armed to venture out into bird land.

We started walking around the perimeter of the westernmost landmass, with Mike using his distant measuring wheel. We had to be very careful so as not to step on a bird because there was little space between the birds on the ground. We only walked about 100 feet when a huge bird flew over us and instigated an attack. We both put up our poles, and after many jabs at the bird, the bird finally decided to stop the attack.

After measuring the perimeter of the first landmass, we walked along the narrow strip to the eastern landmass, where the Loran Station and tower were located. On the way, we were dive bombed by two birds. Using the poles once again, we were able to discourage the birds from attacking further. We walked around the perimeter of the Eastern landmass and made measurements.

Then Mike said, "Normally the wind blows from the Northeast. However, there is no guarantee that this will be the direction the wind will be blowing on the night of the shot; therefore, we must obtain enough smoke generators to blanket all the Sand Island with dense black, non-toxic smoke regardless of which direction the wind may be blowing. I know that this will require a lot more individual smoke generators, but it's the only way we can ensure that the birds will be protected from the thermal pulse. As you're well aware, both of us will be in deep trouble if the birds are not completely protected. The smoke generators must be able to be started electrically because EG&G will have to send a timing signal to Sand Island to start the smoke generators sometime prior to the shot. Electric power is available at the Loran Station."

"How soon do you think you be able to get the smoke generators? "

"As soon as I get back, I'll make up a plan showing how many smoke generators are

required. Then I'll contact my H&N home office in the states and have the smoke generators purchased and shipped to Johnston Island by air. This means is that I should have generators delivered to Johnston Island by July 9, and I estimate that we can have all of smoke generators placed on Sand Island no later than July 11."

On the way back to the boat dock, we were once again attacked about four times by huge birds. We utilized the poles to fend off the birds. When we reached the boat docks, we boarded the small boat and return to Johnston Island.

On the way to our offices, Mike said, "As soon as I finish the smoke generator plan, I will show it to you to make sure that you concur with the plan. I would appreciate it if you take care of contacting Don Wood of EG&G and arrange for the time signals to be sent to Sand Island to start the smoke generators in sufficient time to cover all of the birds with the dark, non-toxic smoke before the '**TEAK**' Shot explodes and the '**ORANGE**' Shot explode?"

"Yes, I'll make all the necessary arrangements with Mr. Wood of EG&G." Then they both returned to their respective offices.

About 1500 hrs., a messenger arrived at the WET office with a document from Mike. It was the layout for the smoke generators. I reviewed the plan; then I called Mike, "Mike, I have reviewed the smoke generator plan, and it looks fine. Please go ahead and place the order for the smoke generators."

"I will place the order right away. Don't forget to talk to Mr. Don Wood of EG&G about the timing signals for the smoke generators."

"I won't forget." I hung up. Then I turned to Petty Officer Jones, "I would like you to make me two copies of the smoke generator plan that we received from Mr. Mike Benson. I'm going to ask Mr. Don Wood, EG&G, to come to our office. When he arrives, I want to give him two copies of the smoke generator plan because he will have to provide a timing signal to start the smoke generators prior to each Rocket being launched and another timing signal to turn off smoke generators after the shot."

"I can have the two copies for you and approximately five minutes."

I called Mr. Don Wood, EG&G. "Don, this is Bud. I would appreciate it if you come to my office because I have a requirement for two timing signals. I can show you the plan and discuss the plan with you after you arrive."

"Bud, I will come over to your office in about 20 minutes."

After about 20 minutes, Don Wood entered the WET office. Then I said, "Don, please come over to the drafting table, and I'll show you a smoke generator plan."

Don walked to the drafting table and viewed the smoke generator plan. I told him," What we need you to do is to provide a timing signal to Sand Island to close electric relays so that the smoke generators will be started about 10 minutes before the shot. Then five minutes after the explosion, we would like you to provide a timing signal to Sand Island to open the relay to stop the generation of smoke by the smoke generators. There is already electrical power to the Loran tower on Sand Island. Mike Benson, H&N, will coordinate with you on this project and will furnish and install any required equipment."

"Bud, we will provide you with the timing signals that you need. How soon will the smoke generators installed?"

"Smoke generators are scheduled to arrive on July 9 and will be completely installed on July 11. Mike will keep you informed as to the schedule."

"I'll coordinate with Mike to make sure this project is completed as scheduled, and also, I will perform tests to make sure the timing signals function as requested."

"Later, if you have any questions, please give me a call." Then Mr. Don Wood left the WET office.

Petty Officer Jones said, "Well you have solved another problem, but I can't help but feel that this is just the beginning of more problems and challenges in which you will be facing before the shot date."

BUD'S MEMORIES OF EXPERIENCES
ON
OPERATION HARDTACK

PART 5

On to July 1st, Major Devlin called Dr. Debus, Mike Benson (H&N), and myself to notify us that on July 2nd, a C-124 aircraft will be arriving at 0900 hours and that another C-124 will be arriving about 1400 hours. Major Devlin stated that the Rocket **Thrust Unit** on each plane should be unloaded as soon as possible, so that these planes can achieve a quick turnaround on July 2nd.

At 0845 on July 2nd, Air Force Major Devlin and his crew of four men, Dr. Debus and his group of 14 men, Mike Benson (H&N), and his group of six men, Petty Officer Jones and myself met at the aircraft parking apron. At 0850 a C-124 landed on the main runway and then taxied to the aircraft parking apron. Then the plane rotated on the parking apron until the nose of the plane pointed toward the buildings on the center part of the Island. The engines of the aircraft were shut down, and major Devlin's crew placed chocks on each side of the wheels to secure the aircraft. Petty Officer Jones commented, "It just doesn't seem possible that those four engines with propellers could get that big plane off the ground. Lieutenant Vance, do you know how big that plane is?"

"Yes, I do. The plane is about 48 feet high and about 130 feet long. I'll have to admit that it doesn't look like an airplane that can really fly."

Major Devlin's crew put a ramp up to the back door of the plane so some of the plane crew members could exit the aircraft. Later Major Devlin and a crew member, a Master Sargent, were at the front of the airplane talking. Then the clamp shell doors in the nose of the plane started to open. One nose door went to the right and the other nose door went to the left. Once full opened, two vertical ramps could be seen. Then the ramps started to move to the down position until the top of the ramps touched the ground. Now the groups could see the semi-trailer with the **Thrust Unit** of **Rocket 50** in the cargo bay.

The aircraft crew began to remove all of the aircraft hold downs attached to the semi-trailer. Also Dr. Debus' group walked up the ramp and boarded the plane. His group checked to make sure that the Rocket was still properly secured to the flat bed of the semi-trailer. Later, two of Dr. Debus personnel got into the cab of the semi-trailer and drove the semi-trailer out of the aircraft, on to the parking apron, and then followed the guide car provided by H&N. This guide car led the semi-trailer to warehouse 101 where the **Thrust Unit** of **Rocket 50** will reside temporarily. This unit is for the "**TEAK**" Shot.

In the afternoon the second C-124 arrived with the **Thrust Unit** of **Rocket 51**. The semi-

trailer was off loaded as before, and the semi-trailer with the **Thrust Unit** was driven and parked in warehouse 101. This unit is for the "**ORANGE**" Shot.

During July 3rd through July 5th, Mike Benson, Petty Officer Jones and myself provided whatever assistance Dr. Debus group required in setting up the Rocket Control Center Bunker.

On July 9th at 0700, Mike Benson, (H&N) called. When I answered, Mike said, "Bud, this is Mike. The smoke generators arrived late yesterday; so, I will be sending a crew of men to Sand Island to install the smoke generators. I expect that all of the work will be completed by the evening of July 10; so, on July 11 we can run a test to ensure the smoke will cover all of Sand Island. I know that you will want to witness the test, but do you also want to be on the Island on July 9 and 10 while my men are installing the smoke generators."

"No, I just want to witness the test."

On July 11th at 1000, Mike and I traveled by boat to the Bird Island area to witness the smoke generation test which was very successful. The whole island was covered with black non-toxic smoke.

At 1500 hours, I called General Dawson's telephone number. The phone was distinctly answered by Colonel Jamison as I could recognize the sound of his voice, "This is General Dawson's quarters. Colonel Jamison speaking."

"Colonel, this is Lieutenant Vance. The last time we met, I promised the General that I would keep him informed on the installation of the smoke generator to protect the birds on Sand Island. The smoke generators are installed. At 1000 this morning, July 11, we tested the smoke generators and determined that the smoke covers all of Sand Island in such a manner as to provide adequate protection for the birds.

"We appreciate your keeping us up to date on the status of the smoke generators."

Then Colonel Jamison hung up and I hung up.

Later when Mike and I met, I said, "Dr. Debus tells me that his group is going to mate the **Rocket 50 Thrust Unit** and the **Rocket 50 Body Unit** near the launch pad because this area is clear of any structures or objects and is very level. The **Rocket 50 Body Unit (the aft and nose cone)** should arrive by a C−124 tomorrow morning. So now you know where to position your huge Crane with 150-foot boom which will be needed for mating procedure. Please remind your Crane operator to be extra careful. Also, the **Body Unit** for **Rocket 51** will be coming in tomorrow afternoon via a C−124. Each **Rocket Body Unit** is 28 feet long.

"The Crane is all set up for tomorrow; and believe me, I already have cautioned my Crane

operator to be extra careful because this item is very delicate and expensive. I'll see you tomorrow at the launchpad."

0700 hours on July 12th, Dr. Debus and his group, Mike Benson (H&N), and his Crane operator and three other members of his crew, Petty Officer Jones and I met at the Rocket launch site. Dr. Debus said, "Mike, I need one of your men to go down to warehouse 101 and unlocked the door. My men will ride with your man to the warehouse. Then my men will drive the semi-trailer with the **Rocket 50 Thrust Unit** to the launch pad area."

Mike turned to his foreman, John Lawrence, and said, "John, I want you to take two of Dr. Debus' men and go to Warehouse 101 and unlock the doors. You should take them in your vehicle because these two will be driving the semi-trailer with **Rocket 50 Thrust Unit** back to the launch site area."

The three personnel departed in John's vehicle to Warehouse 101. Within 20 minutes, the semi-trailer arrived with the **Thrust Unit.** Mr. Fritz, one of Dr. Debus men, directed the driver as to where to park the semi-trailer in the launch site area and about hundred feet from the taxiway.

At 0845 some of Dr. Debus' men drove their vehicle onto the taxiway, and then proceeded along the taxiway until they came to the aircraft parking apron. They stayed there waiting for the arrival of a C−124.

At 0900 a C-124 landed on the runway, and at the end of the runway the plane turned left onto the taxiway apron, and then proceeded on the North-South taxiway to the aircraft parking apron. The unloading procedure for this **Base Unit** was the same as for the Thrust **Unit.**

At 1030 the semi-trailer arrived at the launch area with the **Base Unit**, **Rocket 50**. Mr. Fritz directed the driver to pass on the East side of the semi-trailer with the **Thrust Unit,** and once clear of the other semi-trailer, Mr. Fritz directed the driver to stop and set the brakes. Then Mr. Fritz directed the driver to put chocks on both sides of each tire, as a double insurance that the semi-trailer will not move during mating process. The **Body Unit** extends about six feet beyond the end of the semi-trailer. This is to make the mating of the two units an easy process.

Mr. Fritz's men put the slings on the **Thrust Unit**. Then Fritz gave signals to the crane operator to lift the **Thrust Unit** above the semi-trailer. Once the lift was made, the driver of this semi-trailer drove his rig to another part of the launch site area. Then Mr. Fritz gave a signal to the crane operator to maneuver to the mating end of **Thrust Unit** to connect with the mating end of the **Body Unit**. Finally, the two unit were mated.

Petty Officer Jones turned and asked, "Lieutenant Vance, what holds the two units together."

"In just a few minutes, you will see some of Fritz's men go to the junction of the two units

and install six explosive bolts, which will hold the two units together. “

"Why are these six bolts explosive bolts?"

“After the Rocket is launched and reaches a certain altitude, the explosive charge in the bolts will be activated and this will cause the separation of the **Thrust Unit** and the **Body Unit**."

We watched as Mr. Fritz’s men installed the six bolts.

Then special supports were put under the **Thrust Unit** part of the Rocket. Once this was done, the sling on the **Thrust Unit** part of the Rocket was removed, and the rotating frame assembly, commonly called the “tilt ring", was secured to the rear of the **Thrust Unit**.

Then Fritz’s men attached two cable on the Thrust Unit just below the junction of the two units. Fritz directed the crane operator to lift the Rocket to a vertical position. Once the Rocket was vertical, he directed the crane operator to move the Rocket over the XM74 launcher, which is on the launch pad. Once the Rocket was over the XM74 launcher, the Crane operator slowly lowered the Redstone Rocket until the Rocket was properly seated and secured on the XM74 steel launcher mechanism. The hoisting cables were removed from the Rocket.

Then Dr. Debus said, “Lieutenant Vance you can now move the tower around the Rocket. Just remember that there is only a six-inch clearance between the tower platforms and the Rocket."

I said to Petty Officer Jones, “Please remove all of the chocks around the wheels of the tower."

“Sir, I will take care of the chocks immediately."

As soon as the chocks were removed from around the wheels of the tower, I removed the small control box from the tower and then started moving the tower towards the launch site. The tower moved so slowly that I had no problem holding the control box and keeping up with the movement of the Rocket tower. After the tower had moved about 75 feet, I stopped the tower and waited for Petty Officer Jones to remove electrical connection at the tower storage pad and to drag the power cable to the concrete fire revetment and plug it in to a power connection.

I moved the tower to the launching pad and stopped about one foot from the Rocket. Then I called to Mr. Fritz and ask him to come over and talk to me. I said, “I am at the side of the tower, and therefore I do not have a view of the platforms and the Rocket. I would appreciate it if you would stand in front of the tower so that you could determine if there is any problem with the platform of the tower and the Rocket. As you well know, the design provided for only a gap of six inches between any platform level and the Rocket, and a wind of any magnitude could sway the tower, which is 100 feet tall. "

"I would be happy to do that for you however, I hope that you understand that, if some goes wrong and the Rocket is struck and falls over, you and I will both be in deep trouble."

I started moving the tower around the Rocket. Then at this time Mr. Fritz signaled me to stop the tower. Mr. Fritz did this because he needed time to check to make sure that there was adequate clearance of the platforms at all levels. Once he determined that there was adequate clearance at all levels, he signaled me to move the tower forward. I moved the tower forward until I had reached the stops, and now the tower was completely around the Rocket. I activated the brakes on the tower. Petty Officer Jones then put the chocks around the wheels of the tower to make sure that the tower will would not move due to any bump or strong wind.

At 1500 hrs. another C-124 landed and taxied to the aircraft parking apron. This aircraft had the **Body Unit** for **Rocket 51** which was for the "**ORANGE**" Shot. Mike Benson and Dr. Debus sent their men to the aircraft parking apron to unload the semi-trailer from the plane and store the semi-trailer with the **Base Unit** for **Rocket 51** in warehouse 102.

Then I said, "Dr. Debus, remember that you have to contact the Marine Master Sargent to provide a Marine guard at the entrance to Warehouse 102 to prohibit any unauthorized person from entering. The ***Gadget*** is on the end of the **Base Unit, Rocket 51."**

"Thanks for reminding me. I'll take care that matter right away."

Both Petty Office Jones and I returned to the WET Office. Then Petty Office Jones turned to me and said, "Well, Lieutenant, you now have reached the golden milestone; the Rocket is in place. So, I guess all of your problems now are behind you."

"I wish I could be as optimistic as you are, but I have a strange feeling that between now and July 31, the shot date for '**TEAK**' Shot, there are going to be numbers of difficult problems to solve. I don't know what they're going to be, but I just have that feeling that the worst is yet to come."

BUD'S MEMORIES OF EXPERIENCES
ON
OPERATION HARDTACK

PART 6

Early Monday morning, July 14th, I went to the Rocket launching pad to ascertain that the Tower was fully functional. I rode the elevator to the various platforms with some of the engineers in Dr. Debus' group who were working on the Rocket. Once I was convinced that everything was all right at the Tower, I returned to my office at 0900.

I entered my office and walked over to my desk. Before I could sit down, Petty Officer Jones walked over to me and said, "You said yesterday that you felt the 'worse was yet to come.' Well, some of the 'worst to come' has just started. Dr. Baskin called and said that he wanted to meet with you as soon as possible because those eight concrete slabs which were poured for the small instrumentation rockets are oriented in the wrong direction. He went on to say that until new slabs are poured with the correct orientation, the '**TEAK**' shot cannot be launched because all of our small instrument rockets are required to measure the overpressure, and the thermal, beta, gamma, and the neutrons radiation from the explosion. Dr. Baskin said that he was coming right over to talk to you. He indicated that he had already talked to Mr. Benson of Holmes and Narver and got a 'can't do' reply."

"Did he seem to be angry?"

" Yes, very angry."

I went to my desk and sat down to call Mike Benson. "Mike, this is Bud. I understand that Dr. Baskin talked to you about removing the existing concrete rectangular slabs which were for the mounting of the small instrument rockets and installing new concrete pads. Please tell me what you told Dr. Baskin because he is coming over to see me within the next half hour and he is very upset."

"Dr. Baskin came to me and said that the concrete slabs which we poured for mounting of the small instrument rockets were oriented in the wrong direction. These slabs would have to be removed and new ones poured with the proper orientation. I told Dr. Baskin that the concrete slabs were poured according to the orientation shown on the drawings. Then Dr. Baskin said that the orientation at the time the drawings were prepared was correct, but because changes that have been made recently, a new orientation is required. I told Dr. Baskin that we have sent most of our equipment off the Island; so, we no longer have any dump trucks and equipment for breaking up the concrete slabs, nor do we have enough sand, aggregate and cement to pour eight additional

concrete slabs. Therefore, I cannot remove the existing slabs and pour the new ones before the launching date of July 31st. Dr. Baskin said unless a new slab is poured at the proper orientation, there will not be any shot on July 31st, because his instrumentation rockets are to measure the various phenomena, such as thermal, neutrons, gamma, beta, and alpha radiation of the shot. He was very upset, and he asked if there was anybody else that he can meet with and talk to about the problem. I told him that he could call you and talk to you about the matter."

"As you know, you and I will both be in trouble if the shot date is delayed. I would like to propose that we do not remove existing concrete slabs but pour concrete of the proper width on each side of each existing slab to obtain the proper orientation. We could connect the new concrete pour to the existing concrete slab by the use of dowels. The final concrete configuration would be like an X. Do you think you have enough sand, aggregate, and cement on site to make such concrete pours?"

"I think that I have enough materials to do this. I feel that we could have the additional concrete poured by the end of July 15th or the morning of July 16th. I'll use 4000 psi or greater concrete; so that they will be able to mount their rocket launcher frames on the concrete on July 21st. It will be up to you to get Dr. Baskin's approval to do this. So, the ball is in your court."

"I'll give you a call as soon as I finish talking to Dr. Baskin. I don't think that I will have any trouble getting his approval because he certainly does not want to be one to be involved in any delay of the launch date. After I meet with him, I'll give you a call." We both hung up the phones.

As soon as I hung up, Dr. Baskin entered the WET office with a big frown on his face and walked to my desk. I said, "Nice to see you, Dr. Baskin. Please sit down in the chair by my desk. What can I do to help you?"

"I talked to Mr. Benson and told him that the concrete slabs for the instrumentation rockets are oriented in the wrong direction. He told me that the slabs were oriented in accordance with the plans which he was given. I requested that concrete slab be removed, and new slabs be poured at the proper orientation. He told me that he no longer has the equipment or manpower to do this in time for the launch date of July 31. I told him that until the slabs are oriented the proper direction, there will be no shot. I hope that there is something you can do for me because I do not want to be associated with causing any delay to the July 31st '**TEAK**' Shot."

"I have a recommendation which may solve the problem. Instead of tearing up the existing eight concrete pads, we can just leave them in place. Then we will pour concrete of the proper width and proper orientation on both sides of the existing concrete slabs. The new slabs will be tied to the existing slab with dowels to make sure that there is no movement between the slabs and will be oriented as you have requested. The final configuration of the concrete will look somewhat like an'X'. If you consider this to be a viable option, then I'll authorize Mr. Benson to undertake the work today and to have all the work finished by the morning of July 16. We will use 4000 psi

or greater concrete; therefore, on 21 July, you will be able to mount on the concrete slabs your rocket launcher frames which will hold your instrumentation Rockets prior to launching."

Dr. Baskin went through some mental gymnastics and after about a minute of contemplation, he said, "Your proposal for correcting the problem is fine with me. Thanks very much for your help." Then Dr. Baskin was smiling as stood up and left the office.

Petty Officer Jones had been listening to our conversations. He walked in and said, "Lieutenant Vance, I thought you were going to ask Dr. Baskin who was responsible for the plans showing the incorrect orientation of the slabs. I was wondering why you did not ask him this question?"

"Well, I could tell that Dr. Baskin was very frustrated and upset, and therefore, I did not want to ask such a question and increase his level of frustration, especially since the problem had been solved."

Then I picked up the phone and called Mike Benson and said, "Mike, I just talked to Dr. Baskin and he has consented that the work can proceed as we discussed. Just remember that I promised him that all concrete slabs would be poured by the morning of 16th of July and that he would be able to secure his mounts to the concrete slabs on July 21st.

"I'll get my men started this afternoon, and I can assure you that all work will be done by the morning of July 16th."

The rest of July 14 was uneventful. On the 15th and 16th Petty Officer Jones and I checked on the work on preparing the concrete slabs for Dr. Baskin. On the morning of July 17th, Petty Officer Jones and I were in the WET office sitting at our desk. A civilian entered the office. He was wearing a short sleeve shirt and khaki short trousers, which is standard for most all of the civilians on the Island. He walked over to my desk and said, "I am Dr. Hobbs. My scientific experiment is to determine if the thermal pulse of the '**TEAK**' Shot could cause chorioretinal burns and permanent damage to the eye of a human who is on Johnston Island and who is looking at the fireball. If a person is not looking directly at the fire ball, then such person may suffer from 'flash blindness', which is a temporary condition which may last from a few minutes to several days. However, during the test, we are going to use rabbits instead of humans. My people have built the rabbit holding frames from the materials which were provided by Homes and Narver and these frames will constrain the rabbits to make sure that their eyes will be exposed directly to the thermal pulse. I have been authorized to stay on the Island during the shot because I will have to examine the rabbits' eyes as soon as possible after the shot. I know that the Rocket Control Bunker will be quite crowded, and so I was wondering if there's another place for me to stay during the shot?"

"There is an underground Dispensary on the Island. This is the place that five other scientists and doctors are going to reside during the shot. I would suggest that you stay in the underground Dispensary with them. There is plenty of room."

"Thank you, I'll make arrangements to stay in the underground Dispensary.

"Before you go, I would appreciate it if you would answer two question for me?"

"I'd be happy to do so. What are your questions?'

"How long does it take an eye of a human to close when exposed to a very brilliant light, and how long does it take for an eye of a rabbit to close when exposed to a very brilliant light."

"When the eye of a human is exposed to a brilliant light, such eye will close within 100 milliseconds (0.1 second) to 150 milliseconds (0.150 second) whereas the eye of a rabbit will close within 250 milliseconds (0.250 second) to 350 milliseconds (0.350 second)."

"Dr. Hobbs, I wish to thank you very much for answering my questions. If there's anything else I can do for you at any time, please come by and see me."

Then Dr. Hobbs left the WET Office.

The day of July 18 was just a normal and uneventful workday. However, July 19 turned out to be the start of some catastrophic events. Petty Officer Jones and I were in the WET office in the morning and were feeling that all the many serious problems were behind us and that all projects were proceeding successfully. However, things were about to change.

The phone rang and Petty Officer Jones answered, "WET Office. Petty Officer Jones speaking."

"This is Dr. Debus. I would like Lieutenant Vance to come over to my office as soon as possible because there's one big problem with the tower elevator."

Petty Officer Jones put his hand over the mouthpiece of the telephone, and then said, "Dr. Debus is on the phone and he wants you to come over to his office as soon as possible. It seems that there is a serious and urgent elevator problem."

"Tell Dr. Debus that I'll be over to his office in about 10 minutes."

Petty Officer Jones took his hand off the mouthpiece and said, "Dr. Debus, Lieut. Vance will be at your office in 10 minutes." Then both of them hung up.

I finished working on some paperwork on my desk and got up and walked over to the entrance where I picked up my Cap and put it on. Then I left the WET office and walked to Dr. Debus' office. When I entered, I could see that Dr. Debus was sitting at his desk which is at the back of the room. I walked to the desk of Dr. Debus and sat down in the chair. I told him, "Kurt, I

am here as you requested. From the look on your face, I can only assume that you have a big problem for me to solve."

"The problem is that the tower elevator will run only on the slow speed, and no matter what we have tried, the elevator will not run-on high speed. The day before the shot and the day of the shot, we have so many tasks to accomplish; therefore, the elevator must run on high-speed so that we can accomplish all of these tasks within the time frame allotted for each task. If the elevator does not run on high-speed, we won't be able to the launch the Redstone Rocket on July 31 or ever. Therefore, I'd like you to give top priority to make the necessary repairs or modifications so the tower elevator will run not only on the slow speed but also on high speed."

"As soon as I leave here, I will meet with Mike Benson to discuss the matter with him. I'll ask him to provide me with an electrician so that the electrician and I can work on the elevator on Sunday, July 20th, because on that day the elevator will not be used by anybody else. I'll call you early Monday morning and let you know how soon you can run the elevator on high-speed, as well as slow speed."

"Well, I wish you good luck in your high-speed adventure."

I left Dr. Debus' office and walked next door to the Homes and Narver office. After I entered, I saw Mike sitting at his desk; so, I walked to Mike's desk and sat down in the chair adjacent to his desk. Mike looked up from his paperwork and said, "Bud, I can tell by the look on your face that you have come to talk about a very big and serious problem. I have been laboring under the assumption that we had solved all of the problems. All right, I am ready for you to tell me the terrible news."

"Dr. Debus called me and I went to his office because he said there was a problem with the tower elevator and the elevator will run on slow speed but will not run on high-speed. He stated that the day before and the day of the shot the elevator must run on high-speed because there are so many tasks that have to accomplish in such a short period of time. He also said that in order for the shot to be launched, the elevator must be able to run on high-speed as well as low speed. So, our problem is to figure out how to make the tower elevator run on high speed."

" Bud, when the Tower was erected on the Bikini Atoll, did the Tower Elevator run on high-speed as well as slow speed."

"I don't know because, after the Tower was erected and before the '**TEAK**' Redstone Rocket was placed on the launching pad, a decision was made by high command to cancel the launching of the '**TEAK'** Shot and the **'ORANGE'** Shot from the Bikini Atoll. I can only assume that the Elevator in the Tower on Bikini Atoll could run on slow speed and on high speed. If the Elevator on Bikini Atoll did run on high-speed, then something could have been damaged in the disassembly of the Tower. Of course, there's always the possibility that when the Elevator was

installed in the Tower on Johnston Island that the wiring was not correctly installed, or a part has been damaged."

"Well, Bud, I guess the only way to solve the problem is to send some people up in the Tower to troubleshoot the Elevator problem and make the necessary modifications or repairs."

"Tomorrow, which is Sunday, I would like you to provide me with an electrician so that he and I can spend the day trying to fix the problem."

"Bud, have you ever worked on an Elevator problem?"

"No. However I've taken many Electrical Engineering Courses. I know the simple explanation as to how an elevator works. An elevator car or cab with passengers rises up and goes down in the tower. The top of the car or cab is attached to steel cables which go up and over a pulley or sheave at the top of the tower. Attached to the pulley or sheave is an electric motor which turns the pulley and cause the elevator car or cab to go up or down. There is a counterweight which is connected to the other end of the steel cables which run over the pulley. So, when the car or cab moves up, the counterweight moves down and vice versa. The weight of the counterweight is usually made equal to the weight of the cab plus 45% of a full load placed in the cab. The counterweight lessens the motor output needed. When an empty elevator must go up, the heavier counterweight's fall provides too much energy; so massive resistors are needed to dissipate the excess energy as heat. The same resistance is needed when a fully loaded cab (heavier than the counterweight) is descending. The speed that the cab goes up and down depending on the voltage supplied to the hoisting motor. Our elevator has a manual controller for moving the cab up-and-down. This means that there must be someone in the elevator to operate the controller. The controller is on a metal box. It has a lever which is normally in the vertical position (Stop) but can be rotated as far as 90 degrees to the left to make the cab go down or can be rotated 90 degrees to the right to make the cab go up. This lever has a handle that sticks out horizontally; so, the operator can grip easily the handle and move the lever. When the lever is rotated up to 25 degrees to the right or the left, the elevated runs on a slow speed. It the lever is rotated to the right or left beyond 25 degrees, then the speed that the cab goes up and down is increased. Rotating the level to 90 degrees produces the fastest speed. The lever mechanism is covered by a metal dome. For some reason, the controller, when rotated more than 25 degrees, is not sending a signal to increase the voltage of the motor and increase the speed of the Cab."

"You could be right. My electrician, James Jensen, will meet you at the tower at 0800 on Sunday, July 20th."

"Thanks, Mike. I will let you know what we are able to accomplish on Sunday."

Then I left and returned to my office. I told Petty Office Jones about the problem, and then he said,"Did H&N contact the manufacturer of the Elevator for help?"

“Yes. The manufacturer said that the Elevator was tested before shipping and the elevator ran on low and high speed. The manufacturer did not offer any helpful suggestions. I felt that James and I will be on our own without any help from the manufacturer.

I was fully aware that the problem was going to be extremely difficult to solve because both James and I were both novices when it comes working on and troubleshooting an elevator. At my normal nightly prayer, I requested help from the Lord, the greatest Electrical Engineer, to guide us in our search for the problem which was preventing the elevator from running on high speed. I felt that without His help, we will probably never solve the problem within any reasonable length of time because there will be so many trial and error possibilities. At my normal morning prayer on Sunday morning, July 20th, once again I requested the Lord’s help in guiding us to solve the Elevator problem.

BUD'S MEMORIES OF EXPERIENCES
ON
OPERATION HARDTACK

PART 7

On Sunday, July 20th, I entered the WET office at 0730 and went to my desk and read the recently received correspondence and messages. At 0745 I left the WET office and walked to the Tower and stood in front of the Elevator door waiting for James Jensen, a Homes and Narver electrician. At 0800, I saw a civilian walking towards me, and I estimated that the civilian was about my age, 34 years old, and noticed that he had dark hair. He was slim but muscular. The civilian walked up to me, stopped, and said, "Lieutenant Vance, my name is James Jensen. I hope that you will just call me James. I am the electrician which Mike Benson promised to send to help you get the Elevator to run on high-speed as well as low speed."

"I hope that you will just call me, Bud. Have you ever worked on an Elevator before?**"**

"No. But I have worked on many motors. Bud, have you ever worked on an Elevator before?"

"No, but many years ago I took many electrical engineering courses; so, I am familiar with how Elevator's work. Since neither of us have worked on an Elevator before, then we should have a guessing good time today."

"I brought with me some very skimpy Elevator plans that were available. These plans show the various components of the Elevator and their locations. Unfortunately, these plans do not show the detailed electrical circuit diagrams for the control board and the relays; so I don't think these plans are going to be of much value in our efforts to make the Elevator run on high-speed. Benson even called the Elevator factory representative for help; and all he would say is that the Elevator would run on high-speed before the Tower and Elevator were shipped to Bikini Atoll.

After the introduction, James opened the platform door to the Elevator and then opened the cab door of the Elevator. After both of us had entered, James closed the platform door, and then he closed the cab door. James then rotated the control lever to the right about 20° and the Elevator started to rise at a slow speed. Then he pushed the control lever to the 90° position, but the Elevator still ran on slow speed. Finally, we reached level **five** and exited the Elevator. Level **six** is at the top of the tower, and this is where the pulley or sheave, the motor, the bank of resistors, the relays, and all of the electrical controls and wiring are located. The only access to level **six** is by using metal ladder attached to the framework of the Tower. We both climbed the ladder to level **six**, which is higher than the 70-foot Redstone Rocket.

James placed the drawings on the floor of the Elevator equipment room. First, we verified the location of all of the Elevator components. Then James said, "If the Elevator in the tower at the Bikini Atoll ran on low-speed and high-speed, then the Elevator should run on slow speed and high-speed, that is, if the Elevator was correctly installed and none of the Elevator components or parts were damaged during disassembly on Bikini Atoll and reassembly on Johnston Island. Consequently, I feel that there must be a poor connection from the cab controller lever to the circuit board or the electrical wire from the cab controller lever is not properly connected to the correct place on the circuit board or there is a damaged component. Since we do not have any detailed electric plans for the circuit board, our method of solving the problem will be by trial and error."

"I would like you to make an electrical drawing showing how everything is connected now; so that, if we make changes that cause even more problems, we can always get the Elevator running as it is now."

"I can do that. Since none of the electrical wires are not labeled, this will probably take me 20 minutes to half-hour to draw an electrical diagram showing all of the electrical wires that are connected to the circuit board."

"While you are doing that, I will just look around level 6 and familiarize myself with all the components that are on this level."

In the process of walking around level **six**, I noticed that the circuit board, the pulley and the motor were all within a covered area, and I also noticed a metal box, about 3' x 3' that was attached to the top guard rail of level **six**, was outside of the covered area and was exposed to the elements. The lid of this box was closed with a metal screws, and it was labeled "Resistors."

At this time James and I guessed at how some of the electrical connections should be made. Once the changes were made, James climbed down the ladder to the level **five** and entered the Elevator. Then he tried to move the Elevator down to level four on high-speed, but the Elevator would run only on slow speed. Once again some more electrical changes were made, and then James tried to lower the Elevator again at high-speed. This time the Elevator did not work at all. This trial-and-error method continued on for over several hours. Finally, it was lunchtime, and so we took a lunch break for about one hour.

We kept experimenting, then finally we made a connection to another relay. Then James climbed down the ladder and entered the Elevator on a level **five**. He ran the Elevator on slow speed and then move the control lever to run the Elevator on high-speed. To the surprise of James, the Elevator ran on high-speed. James yelled up to me and said, "The Elevator is running on high-speed as well as low speed. How long you want me to keep testing the Elevator on high-speed?"

"I'd like you to run the Elevator from level **five** to level **one** and then from level **one** to

level **five** a total of 10 times. In doing so I would like you to stop the Elevator at each level."

James ran the Elevator from level **five** to level **one** and then from level **one** to level **five** three times. The Elevator was now at level **five**, and then James called up to me and said. " The Elevator has stopped running on high-speed. What do you want me to do now?"

At this time, I was standing at the top of the tower near the metal box which contained the resistors. I noticed that the box was extremely hot. I called down to James and said, "Keep the Elevator at level **five** for now. I want to check on the resistors inside the metal box."

I removed the screws from the metal box cover and lifted the cover up to the horizontal position. I could feel the heat from the resistors which were almost a bright red color. Then I closed the lid and looked around for a couple of short metal rods. I found two metal rods which were of the right size. I opened the lid again to the horizontal position and used the two rods to keep the lid propped to the near horizontal position. The lid in the horizontal position would prevent any possible rain from contacting the resistors but would allow the wind to keep the resistors cool. I called down to James and said, "The resistors in the metal box are extremely red hot; so, I have the cover propped up to the horizontal position. As soon as the resistor cool down, I feel that the Elevator will run on high-speed again. I will inform you when you can try to run the Elevator on high speed again."

"OK, I will wait until you feel that it is all right for me to try to run the Elevator on high speed."

It did not take long for the resistors to cool because at 100 feet above the ground, there was a mild wind blowing. Then I called down to James and said, "Go ahead and run the Elevator up and down between level **five** and level **one** ten times on high speed just to make sure the resistors will not overheat again."

James ran the Elevator on high-speed up and down between level **one** to level **one** ten times without any problem occurring. Then I climbed down from the ladder to level **five**. I entered the Elevator with James who said," Bud, I'll let you take the Elevator control lever and take us down to level **one**." I used the Elevator control lever to run the Elevator to level **one** on high speed. Everything worked fine.

When we reached level **one**, we exited the Elevator and walked together away from the tower. We looked at each other and both of us had a big smile on our faces. Then we shook hands and at the same time said in unison, "We did it."

Before James left, I said, "I'm going to inform Mike Benson that you did an outstanding job in getting the Elevator to run on high-speed as well as low speed."

"You're telling my boss this will be gratefully appreciated."

At 0700 Monday morning, July 21st, I entered the WET office. Petty Officer Jones, who was also in the office, said, "Were you able to get the Elevator to run on high-speed?"

"Yes, the two of us somehow managed to get the Elevator to run on high-speed and low speed,"

"Do you think this is the last big problem you'll have to solve before the shot?"

"It would be nice if this were true, but I have a premonition that there are other problems about to materialize. Sometimes a solution to one problem creates another problem someplace else. I am going to call Dr. Debus and give him the good news."

I picked up the phone and called Dr. Debus. Dr. Debus picked up his phone and said, "Dr. Debus speaking."

"Kurt, this is Bud. Yesterday James Jensen, a H&N electrician, and I worked on the Elevator. After a lot of trials and errors, we were finally able to get the Elevator to run on low speed and on high speed. Therefore, I assume that the shot is still on for July 31."

"Thanks very much for getting the Elevator to run on low and on high-speed because now we will be able to launch the Rocket on July 31. Also give my thanks to Mike Benson and James Jensen."

Then Petty Officer Jones and I took some materials and tools with us and went to the tower to make sure that the Elevator would still run on both high-speed and low speed. We used the Elevator to go to level **five**, and then climbed the metal ladder to level **six**. We went to the metal resistor box and installed permanent braces to keep the lid of the resistor box in the near horizontal position regardless of any strong wind which may be blowing at the 100-foot level. Once this was done, we climbed down to level **five** and took the Elevator to the level **zero**. Then we went to the Rocket Control Center to check to make sure that there were no problems. Later we checked on the eight concrete pads for the instrument rockets and determined that the concrete pads were ready as scheduled. Finally, we returned to their WET office.

When we entered the WET office about 1400, I saw Bob Wood, EG&G, who handles the timing signals for the shot. I immediately surmised that Bob would not be there unless there was a very serious problem. As I walked to my desk, I said, "Good to see Bob. Since you have been waiting to see me, I can only assume that there is a very critical problem involved."

In a very stern tone, Bob said, "You are absolutely correct. First let me ask you about when the Elevator started running on high-speed."

"On Sunday an H&N electrician and I worked on the Elevator, and we were successful in getting the Elevator to run on high-speed. I informed Doctor Debus early this morning that the Elevator would run on high-speed, and since then his people have been running the Elevator on high-speed periodically. Dr. Debus told me that unless the Elevator runs on high-speed, there will be no shot on July 31st or ever. He said that there were so many things they had to do within such a short period of time that the Elevator must run on high-speed to get everything accomplished.

"Before today, we have not had any problems with the timing signals. But periodically and for a short period of time this morning, and the voltage of the station generators dropped drastically. When I investigated as to what was causing the drastic changes in the voltage and frequency of the station generators, I learned that the tower Elevator now had the capability to run on high-speed. Evidently when the tower Elevator motor starts running on high-speed, it draws such a high amperage that the voltage of the station generators is decreased significantly. Because of this, the timing signals are disrupted to such a degree that they are useless. This means that as long as the Elevator runs on high-speed, there will be no shot because there will be no timing signals. Maybe you can convince Dr. Debus that he can get by without running the Elevator on high-speed."

"I talked to Dr. Debus a number of times and he is very adamant and insistent that the Elevator must run on high-speed or there will not be any shot on July 31. So, the Elevator must continue to be able to run on high-speed."

"Then all I can say is that you've got a real problem because there will be no timing signals for the shot; therefore, the Rocket will never be launched. I'll leave the problem in your hands to be solved. If there is any way that I can help, please give me a call." Then Bob Wood left my office.

Petty Officer Jones said, "LT. Vance, what do you plan on doing now so as not to delay the shot. You solve one problem and thereby created another problem. "

BUD'S MEMORIES OF EXPERIENCES
ON
OPERATION HARDTACK

PART 8

I turned to Petty Officer Jones and said, "The only solution to the problem to place the elevator motor on a separate large generator."

"I have two questions. First one is: why is running the elevator on high-speed of such a problem for the station generators. My second question is: where are you going to find a large generator because I know that there are no spare large generators on this Island? The shot date is only **10** days away."

"In response to your first question, the amps or current the elevator motor draws upon starting to run on high speed is eight times the normal run speed amps or current. The station generators do not have the capacity to provide such a large surge of current and not have a drastic drop in line voltage. In response to your second question, my only hope is to contact Lieutenant Colonel Mowery on Eniwetok and request that he send me a large electric generator as soon as possible. Previously whenever I have needed help, Lieutenant Colonel Mowery has always found some ingenious way to get whatever I needed for any project. I am going to the Communication Center building to call Lieutenant Colonel Mowery."

I left my office and drove my Jeep to the Communication Center. After I entered, I went to the information desk. I was pleased that I was once again in an air-conditioned office building. Before I could get out a single word to the male civilian clerk behind information desk, the clerk said, "I presume that you are here to see Sam, so that he came arrange a call with Lieutenant Colonel Mowery on Eniwetok."

"You have a very good memory. Yes, I am here to see Sam."

Then male civilian clerk yelled out, "Hey, Sam, LT. Vance is here to see you."

Sam, a civilian, said, "It is good to see you again LT. Vance. Of course I know that you want to talk to Lieutenant Colonel Mowery. You can sit down at that first desk where there is a phone which you can use to talk to Lieutenant Colonel Mowery."

I walked over to this desk, and I sat down. I noticed that there was a phone on the desk and also the pad of paper and a pencil. Sam walked over to the Radio Communication Console. Sam said, "LT. Vance, you'll have to wait a little while. It will take a little time for me to make radio contact with the Communication Center at the Eniwetok Atoll and get Lieutenant Colonel Mowery on the radio. Once he is on the line, you can pick up the telephone and talk to him just as you would if you had dialed him using a land line telephone."

After about five minutes, Sam said, "You can now pick up the phone and talk to Lieutenant Colonel Mowery." I picked up the phone and said, "Bill, this is Bud. I have a very big problem, and I urgently need your help."

"Bud, I heard that you solved the Elevator problem by enabling the Elevator to run on high-speed. So, I really don't know what other problem that you could have."

"Bill, you and I know only too well that sometimes we solve one problem and the solution to the one problem creates another problem for somebody else. This is what happened to me. The Homes and Narver electrician and I were able to get the elevator to run on high-speed on July 20. Therefore on July 21st, Dr. Debus started running the Tower Elevator on high-speed. Then on the afternoon of July 21st, Mr. Wood, EG&G, said that whenever the elevator starts to run on high-speed, the voltage of the station generators dropped considerably and disrupts the timing signals. In essence, he said that if Dr. Debus continues to run the Tower Elevator on high-speed, there shall be no shot on July 31st or ever because there will be no timing signals available. Dr. Debus is adamant that he needs the Elevator to **run** on high-speed to complete all of his tasks necessary to get the Redstone Rocket ready for launching. My solution to the problem is to put the Elevator on a separate power source. Unfortunately, we do not have any spare large generators. Do you have a large generator that you could send to me by a large aircraft as soon as possible? "

"At this moment I am not sure what large generators are available here on Eniwetok that might be suitable, but rest assured that I will find a large generator somewhere, and I will ship it to you by a C-124 as soon as possible."

"Bill, I really appreciate your doing this for me. Please let me know when the generator will arrive."

"Bud, I will send a message and indicated the delivery schedule by tomorrow."

I hung up the phone and thanked Sam for making the connection with Lieutenant Colonel Mowery; then I left the Communication Center drove back to my office.

On July 22nd (Tuesday), a message from Lieutenant Colonel Mowery was delivered to the WET office. This message stated that a large generator will arrive on Johnston Island by a large cargo plane on July 24th (Thursday). I called Mike Benson, H&N, "Mike, this is Bud. Lieutenant Colonel Mowery is shipping a large generator to Johnston Island on July 24th, and this generator is to power the Tower Elevator. Therefore, I will need your personnel to install an Elevator Service Panel on the Tower by July 24th, so that we can connect power from this generator to this Service Panel. Your men will need to place the generator at the appropriate location which will be as far as possible from the launch site, to make sure the generator will run, and to run a power line from the generator to the Elevator Service Panel on the Tower. Keep in mind that this power cable will have to move as the Tower moves from the launch site to the Tower Storage Area."

"Bud, I will provide the necessary personnel on July 24th to make sure that the generator is properly located, is running and is properly connected to the Tower. Do you need any other help at this time?"

I said, "No, not at this time." Then I hung up the phone.

At 1000, the phone rang and Petty Officer Jones answered the phone, "Petty Officer Jones speaking." Person on the other end of the line said, "This is Dr. Debus. Please tell LT. Vance that there is a big meeting in the Rocket Control Bunker for discussing contingency plans. This meeting will be held at 1200 and you are to attend."

"Please hold for a minute Dr. Debus. I told LT. Vance about the meeting, and he said that he will be there." Dr. Debus hung up and then Petty Officer Jones hung up.

I said, "Jones, while I'm at this meeting I would like you to check on the sprinkler system over the LOX (Liquid Oxygen) Park area to make sure the system is charged at the appropriate pressure because soon the LOX trailers will be making liquid oxygen for the Redstone Rocket launch."

We both left the office at the same time.

At 1300 both of us returned to the WET office. Petty officer Jones was first to speak, “LT., I checked out the sprinkler system and it is charged to the correct pressure and is fully functional. By the way, how did your contingency plan meeting go?"

“It really was not much of a meeting. Doctor Debus had his standard contingency plans for a missile malfunction. The discussion of a nuclear contingency plans lasted only about two minutes. I was the only one who had ever seen a nuclear explosion. I related to those present was that if the Gadget exploded while the Rocket was on the Island, then all of us would disappear completely with the Island. I also said that if the Gadget went off at 10 miles up, we would probably be ‘crispy critters’, and there would be few above ground structures left on the surface of Johnston Island. So in essence I said that this was a ‘GO’ or ’NO’ go situation; therefore no real nuclear contingency plans are needed. In other words, it’s a live or die situation."

“Doesn’t knowing this bother you?"

“Not really. I have great confidence in Dr. Debus ability to successfully launch the Redstone Rocket (which has been called Old Faithful) and have the Gadget explode 50 miles above Johnston Island. Doctor Debus and Doctor Wernher von Braun developed the Redstone Rocket, and so far, every launch has been successful. The Redstone Rocket is often referred to as ‘Old Faithful.’ Of course, I realize that it’s always possible for something to go wrong."

“I have another question. When I was in the Tower, I noticed that four pods were being attached to the Rocket. What is the purpose of these four pods?"

“These pods are for recording the phenomena of the nuclear explosion, such as thermal radiation, neutron radiation, gamma radiation, etc. These pods will be ejected from the Rocket at different heights to measure the phenomenon at different distances from the explosion. These pods will fall into the ocean and will be recovered later by Navy ships."

The WET phone rang and Jones answered," WET Office, Petty Officer Jones speaking."

The person who dialed said, “This is Major Devin, USAF. I would like to speak to LT. Vance."

Jones said, “Just one moment and I’ll get LT. Vance on the line."

"LT. Vance speaking."

"This is Major Devlin. I understand that you directed Mike Benson, H&N, to store the 60-55-gallon alcohol drum about 1000 feet from the beginning of the runway and about 150 feet west of the runway. Therefore, these alcohol drums will be adjacent to the lube oil storage tanks. This is a very dangerous place to store the alcohol drums. If a plane should swerve far to the right after landing, it could crash into these alcohol drums and cause of fire and explosion. Possibly some people could be killed. So I'm putting you on notice that these alcohol drums should not be stored there and that you should store them someplace else. If a plane should hit these alcohol drums and cause damage to a plane or to persons, then I'd be required to testify at your court-martial that you were well aware that disastrous consequence could occur from your storing the alcohol drums at this location."

"Major, this is the only reasonable and practical place where the drums can be stored on Johnston Island. The day of the shot, the contents of these drums will be loaded into the 3000-gallon alcohol tanker, which will be parked on the runway at this particular time. Therefore, these alcohol drums must remain at their present location. Maybe you could warn all pilots approaching the runway as to the location of these 60-55-gallon alcohol drums."

"Yes, I will warn all pilots who are landing on the Island about the location of the alcohol drums, but such will not relieve you of any responsibility for any disaster which may occur as a result of the location of the alcohol drums. Just consider this is my official notice to you that the alcohol drums should not be stored in this location because they create a dangerous hazard."

"Yes, Major, I am aware that I will be totally responsible for any disaster which happens as a result of where I have stored the alcohol drums. Is there anything else?"

"No, that is all."

Both hung up the phone. Petty Officer Jones said, "After all that has happened so far, I'm just wondering how many Court-Martial's you are going to be subjected to before you finish with both the "**TEAK**" and "**ORANGE**" shots."

"I really don't knows. My present concern to get the generator for the Tower Elevator."

BUD'S MEMORIES OF EXPERIENCES
ON
OPERATION HARDTACK

PART 9

On July 22nd on a Wednesday, Dr. Debus entered the WET office and walked toward the desk where I was sitting and was talking on the telephone. Dr. Debus sat down in the chair by the side of my desk and waited for me to finish my telephone conversation. Within about 20 seconds, I hung up the phone and said, "Kurt, since you have come to visit me, I can only presume that there is some big problem that has been generated."

"Not really, I just wanted to inform you that there's going to be a big meeting in the Rocket Control Bunker is on Saturday, July 26 at 1100. This meeting will be attended by Navy Admirals, Air Force and Army Generals, some top scientists and my boss, Dr. Wernher von Braun. I am to brief them on the status of the launching of the '**TEAK**' and "**ORANGE**' Shots. You will be required to attend as well as a representative from EG&G who will comment on the status of the timing signals. Therefore, I need to have your assurance that the generator for the Tower Elevator will arrive on Thursday, July 24, and that the Tower Elevator will be disconnected from the station power supply by July 25. Therefore the timing signals will not be affected by the operation of the Elevator running on high speed."

"Kurt, I will be at the meeting. Lieut. Col. Mowery informed me that the generator will arrive on a C-124 aircraft on Thursday, July 24. I have arranged with Mike Benson to have his men offload and place the generator at a specified location and connect the generator to the Tower Elevator. I can assure you that this generator will provide power for the Tower Elevator on Friday, July 25; therefore, the timing signals will not be affected when the tower elevator is run on high-speed."

"Based on what you told me, I feel that the meeting on Saturday, July 26 will be a very successful one." Then Dr. Debus left the WET office.

About 1800 on Thursday, July 24, the large C-124 landed and taxied to the parking apron. After the aircraft doors were opened and the ramps were lowered, an H&N man enter the aircraft and then entered the cab of the low bed trailer with the generator and drove the trailer to the launch site where Mike Benson, Petty Officer Jones and I were waiting. Mike said to me, "Before my Crane operator lifts the generator off the low bed trailer, I need for you to designate exactly where you want the generator placed?" I walked to a location that was about 80 feet from the launch pad and about 80 feet from the Tower Storage Pad and about 40 feet from the track which runs between the Launch Pad and the Elevator Storage Pad. This is the location which Petty Officer Jones and I

had previously measured and staked out. Then I said to Mike, “This is the location for the generator. It is as far as possible from the launch site because when the generator is running, the exhaust pipe will be extremely hot. We don’t want anything that hot to be near the Launch Pad when liquid oxygen is being pumped into the Rocket.” Mike directed the Crane operator to hoist the generator and bring it to the location designated by me. After the generator was placed, I said, “The power line running from the generator to the Tower must be securely anchored to both the generator and the tower. This is because, when the tower is moved from the launching Pad to the Tower Storage Pad, the Tower will drag the power line along with it and vice versa. Also, tomorrow I want a control line run from the generator to the Rocket Control Bunker, so that I can turn the generator ‘off’ and ‘on’ as needed from the Rocket Control Bunker.”

Mike’s electricians disconnected the Tower Elevator from the station power supply. Then the electricians ran a power line from the generator to the new Service Panel for the Tower Elevator. The electricians anchored one end of the power line to the generator and the other end to the Tower. By the time the power line was properly connected and tested, it was now 2000 and dark and the area lights had to be turned on. The electricians tried to start the generator, but it would not start. Mike said, “Bud, do you want all of the electricians to secure and troubleshoot the generator tomorrow morning?”

“Mike, I would like the electricians to stay until the generator is running and until we have tested the Elevator to make sure it run on high-speed. I promised Dr. Debus that he would be able to run the Elevator on high-speed early tomorrow morning, Friday, July 25. ”

“My electricians, which includes James Jensen, will stay until the generator is working and the Elevator has been tested to your satisfaction.”

“James, I would like you to go to the Tower Elevator, and as soon as power is supplied to the Elevator from the Generator, I want you to test the Elevator to make sure it will run on high speed and low speed.”

James left the group and walked over to the Tower and entered the Elevator. Within a short time, one of the electricians said, “We found some minor problems which prevented the Generator from starting. Of course one problem was a plugged fuel filter. We have corrected all of the problems; so we are ready to start the generator.”

The Generator started and the electricians closed the generator power switch which sent power to the Tower Elevator. I walked to the Tower area and said, “James, I would like you to run the Elevator on high-speed to the top of the Tower and then to
the bottom of the Tower 10 times just to make sure that the elevator is functioning properly. This is the same procedure as we used before. ”

“Yes, sir.”

When James started the Elevator on high-speed, the speed of the generator slowed momentarily, and then resumed normal speed. When the Elevator was on the last test run, I noticed that the exhaust stack on the generator had turned to a cherry red. This was my reasoning for putting the generator as far away as practical from the Rocket launch site where liquid oxygen will be loaded into the Rocket.

Mike said, “Bud, tomorrow I will have a control wire run from the generator to the Rocket Control Center Bunker so that you can turn the generator on and off from the bunker. If there are any other tasks that you need my men to perform before Sunday, you should tell me now because Saturday, July 26, will be the start of evacuating all nonessential personnel from Johnston Island. Sometime early next week the rest of my men and I will be leaving the Island.”

“Mike, I cannot think of anything right now.”

Then everyone departed to his respective apartment building.

At 0730 on Friday, July 25, Mike and two of his electricians, and I were at the generator. The electricians commenced running an electric control cable from the generator to the Rocket Control Bunker. Mike said, “Bud, I am going to put this control cable in conduit so that there is no danger of anyone accidentally damaging the control cable. “

”Mike, let me know when the control cable has been run to the Rocket Control Bunker. Late this evening, after Dr. Debus men have finished their daily work on the tower, we can check to make sure that the generator control switch at the Rocket Control Bunker will actually turn the generator on and off.”

“Bud, I’ll meet you at the Rocket Control Bunker at 1900, so we can test and make sure that the generator switch is functioning properly.”

Then I departed from the generator site and went to the Rocket Launching Pad. I wanted to make sure that the Elevator was running on low and high speed.

At 0900 on July 25, Petty Officer Jones arrived at the launch site to give a message to me. Petty Officer Jones said, “Lieutenant, Dr. Debus called and said he would like for you to meet with Mr. Wood, EG&G, and himself at the Rocket Launch Pad at 1000 today. Dr. Debus did not say what was going to be discussed at this meeting.”

“That’s all right. I’m sure I know what Dr. Debus and Mr. Wood want to discuss. When you return the office, call Dr. Debus and tell him I’ll be there at 1000 meeting.”

Petty Officer Jones returned to the WET office and made the call to Dr. Debus. I decided

to make sure the elevator was running properly; so, I rode the elevator up and down with some of Dr. Debus Rocket experts.

At 1000 Dr. Debus started walking to the tower where I was. From a different direction Mr. Wood, EG&G, start walking towards me. When we all met together, I said, "Good morning Dr. Debus and Mr. Wood. I presume that you came here to discuss with me the electrical power for the elevator and the timing signals. Is that correct?"

Dr. Debus replied for both of them and said. "Yes, it is."

" Late yesterday afternoon, July 24, we received the generator from Eniwetok. Later that evening, we disconnected the Elevator power cable from the Station Generators and ran a new power cable from the received generator to the Tower Elevator. In order to make sure that all electrical connections were correct, we ran the Elevator up and down the tower 10 times on high-speed to verify that the generator would handle the load. No problems were encountered. This morning, your crew, Dr. Debus, has been running the Elevator on high-speed without any problems at all.
Mr. Wood, I presume that the timing signals today have been stable because the Tower Elevator is no longer connected to the station power supply. Is that correct?"

"Yes, that is correct. Since last night when you permanently removed the power to the Elevator from the Station Generators, we have had no problems with the timing signals, and we don't expect any timing signal problem at any future time. So far as I'm concerned, the '**TEAK**' shot is on for July 31st."

Then Dr. Debus said, "Since the timing signals are all right, I will be able to report at the meeting tomorrow that the shot will go as scheduled. Also I want to remind both of you that you are scheduled to be at this meeting tomorrow at 1100 at the Rocket Control Bunker. "

Both Mr. Wood and I told Dr. Debus that they would be there at the meeting. Then Mr. Wood left and returned to his office.

Dr. Debus turned to me and said, "All the dignitaries will be coming from Hawaii by plane early tomorrow morning, so that they will be able to attend the meeting in the Rocket Control Bunker at 1100, and I would like you to come to the Rocket Control Center at 1030 because I would like to introduce you to my boss, who is Dr. Wernher von Braun. Do you know much about him?"

"I have heard a few things about him, but I do not know much about Dr. von Braun. As a matter fact I know very little about you because we have been so busy with so many crises, and we have never had much time to talk about your personal experiences."

"Both of us were born in Germany, and Dr. von Braun was a space visionary and genius. We both worked on the V2 rocket. When it was apparent that Germany was losing the war, Hitler ordered his troops to kill Dr. von Braun and myself and also the 500 people who worked for Dr. von Braun. We gave ourselves up to the U.S. Army."

"Then what happened to you?"

"All of us were transported to the United States, and we went to work at the Army Arsenal in Huntsville, Alabama. Dr. von Braun became head of the Ordinance Guided Rocket Center at the Redstone Arsenal in Huntsville Alabama. Then Dr. von Braun named me to lead a new Experimental Rockets Firing Branch. Also starting in 1952, I supervised the development and construction of the rocket launch facilities at Cape Canaveral."

"I seem to remember someone saying that before you came to Bikini in 1958 you were part of launching the first USA satellite. Is that true?

"You may not remember that the Russians put its first satellite up on October 4, 1957. As a result, the United States wanted to put a satellite up as soon as possible. Initially the Navy was designated to do this, but unfortunately the Navy rocket blew up while it was still on the launch pad. After this failure, the Army was tasked with putting the first USA satellite up."

"What rocket did you use to put the satellite into orbit?"

"In November 1957, Army General McDarius met with Dr. von Braun and asked him if he could modify the Redstone Rocket and launch a satellite in three months. Of course, Dr. von Braun said that he can do it. Dr. von Braun and Dr. Debus worked diligently to modify the Redstone Rocket and by January 31, 1958 we launched the first United States Satellite."

"I will definitely be at the Rocket Control Bunker 1030 tomorrow because I would like very much to meet Dr. von Braun."

" After you meet him, you can go back to your office and continue preparing for the meeting. I will be showing Dr. von Braun around the Rocket Control Center and will be discussing with him the launch preparation and sequence."

I left the launch site and returned to my office.

BUD'S MEMORIES OF EXPERIENCES
ON
OPERATION HARDTACK

PART 10

July 26th at 1030, I walked from my office toward the 30' x 30' concrete Rocket Control Building. The main room was 15' x 30' and the other two adjacent rooms were each 15' x 15'. Each of these two rooms were connected to the main room by a 4 x 8' opening. There was no door in either opening. The left room or cubicle was for the Rocket launching instrumentation and personnel and in the right room or cubicle was mainly for the Rocket Safety Officer, his personnel, and all of his electronic equipment. The exterior walls of the concrete Rocket Control Center which faced the Rocket launch site had sandbags built up at a 45 angle from the ground to the top of the concrete Rocket Control Bunker. I had requested that the sandbags be placed at such an angle so as to minimize any damage to the Control Center by any non-nuclear explosion at the launch site or any debris which may be hurtled during the launching of the Redstone Rocket. When a blast wave hits a vertical surface, the reflected pressure that a vertical wall may experiences can be two to five times the over pressure of the blast wave. At a 45 slope, the reflected pressure will be only slightly greater than the over pressure of the blast wave.

When I opened the blast door to Rocket Control Center and entered the main room, I saw a lot of the members of Dr. Debus' crew working in the main room and in the two 15' x 15' rooms in the Rocket Control Bunker. In the main room, Dr. Debus' crew was mounting on the west wall a large TV set, so that during the shot, those in the main room could watch the launching. At this time, I saw Dr. Debus and another individual exit from the Rocket Launching Room, which is on the left, and both men started walking towards me. I felt confident that the individual with Dr. Debus must be Dr. Wernher von Braun. When Dr. Debus was about two feet away, I greeted him, "Good morning Dr. Debus."

"Good morning LT. Vance. I would like you to meet Dr. Wernher von Braun, who is the Director of the Army Ordnance Guided Rocket Center in Huntsville, Alabama and who is also my boss." Dr. von Braun and I shook hands.

"I'm very honored to meet you Dr. Von Braun. Dr. Debus has told me so much about you, especially how the two of you modified the Redstone Rocket in less than three months and then used this modified Redstone Rocket to put the first USA satellite in orbit on January 31, 1958. Dr. Debus stated that you are truly a space visionary and genius."

"I'm very happy to meet you, LT. Vance. Dr. Debus told me that you are in charge of the

construction on Johnston Island and are responsible for getting all of facilities ready for the two shots. You seem a little young to have such a big responsibility."

I smiled at his comment.

He continues, "Dr. Debus told me that it took four months to build the rocket facilities on Bikini, and you have built the facility on Johnston Island in two and a half months. He has also said that it was your perseverance, ingenuity and resourcefulness that resulted in the schedule being reduced to two and half months. I am very impressed with what you have accomplished."

"I must say that Dr. Debus worked hand-in-hand with H&N Construction Manager and I to shorten the construction schedule so drastically."

Then Dr. Debus said, "LT. Vance, I'm going to continue to show Dr. von Braun all the facilities here in the Rocket Control Center. I know that you have other things to take care before the meeting; however, I would like you to come to the Rocket Control Center about five minutes before the meeting starts."

"I will arrange my schedule so that I will be at the meeting at 1055. It was wonderful meeting you, Doctor von Braun. "

I walked back to my office and sat down at my desk. Petty Officer Jones walked over to me and said, "At the 1030 meeting with Dr. Debus, did you have an opportunity to meet Dr. Wernher von Braun?"

"Yes, and he is a very nice gentleman."

"Does Dr. Von Braun speak English?"

"Yes, he does. He has an excellent command of the English language. He is what one would call a space genius."

"I just want to remind you about your meeting at the Rocket Control Center 1100. Also, what would you like me to be doing while you are at this meeting in the Rocket Control Center?"

`"I'd like you to go to the launch site and ensure that everything is ready because after the meeting is over, Dr. Debus will be bringing all of the **VIP's** (Very Important Persons) to the launch site. Doctor Debus will take all of them in the elevator to levels one, three, and four of the towers to view the Rocket, especially the level where the Nuclear ***Gadget*** is located. Of course, after the 1100 meeting, I will be returning to my office."

Petty Officer Jones left the WET office and went to the launch site. I sat at my desk and

tried to contemplate the questions which I may be asked and how I would answer such questions.

At 1045, I left the WET office and walked to the Rocket Control Center Bunker. As I entered the main room, I noted that Dr. Debus was leading a **VIP** (Very Important Persons) group, consisting of Navy Admirals, Air Force Generals, Army Generals, number of civilian scientists, and Dr. Wernher von Braun, to a set of chairs placed in a semicircle at the East end of the main room. When the **VIP** group sat down, Dr. Debus walked over to four chairs which were about in the middle of the main room and asked Brigadier General Dawson, the Johnston Island Commander, to sit down in the second chair, and Mr. Wood to sit in the third chair. Dr. Debus saw me and motioned for me to come and sit down in the vacant chair next to Mr. Wood. After I sat down, I looked around and noticed that all of Dr. Debus's crew had vacated the Rocket Control Center and the exterior door to the main room had been secured.

Then Dr. Debus said, "Gentlemen, now that you are comfortably seated, I would like to introduce you to Brigadier General Dawson, who is the commander of Johnston Island. At this time, Brigadier General Dawson stood up.

Doctor Debus said, "I would like to introduce you to Mr. Wood who is in charge of all the time signals." Mr. Wood stood up to greet me.

Dr. Debus continued, "I would like to introduce you to LT. Vance,
Civil Engineer Corps, U.S. Navy, who is responsible for getting all of the facilities ready for the two shots." At this time I stood up. After the introductions, Brigadier General Dawson, Mr. Wood (EG&G) and I sat down.

Then Dr. Debus said, " I will give you a general briefing of my Mission here on Johnston Island. During this general briefing, please feel free to ask any questions. After the general briefing, I take you to the Rocket launch room and the safety officer room and give you detailed briefings. After such briefings, I will take you to the launch site and take you up in the Tower Elevator to levels one, three, and four, so that you can view the various sections of the Redstone Rocket. After your tour of the Redstone Rocket, Brigadier General Dawson will take all of us to the cafeteria to lunch. Are there any questions before I start the general briefing?"

Dr. Debus did not see any hands raised; so he started his general briefing. "My mission is to launch two Redstone Rockets, each carrying a large nuclear device (or as LT. Vance calls them, ***Gadgets***), high into the atmosphere where the ***Gadgets*** will be exploded. The first launch will be on July 31 and this launch will be called the '**TEAK**' shot. When the rocket is 5.4 nautical miles horizontally from Johnston Island and at an altitude of 250,000 feet, the ***Gadget*** will explode. The second launch will be on August 11, and this launch will be called the **'ORANGE**' shot. When the rocket is 21 nautical miles horizontally from Johnston Island and at an altitude of 145,000 feet, the ***Gadget*** will explode. Up until this time, no high yield Nuclear ***Gadget*** has been exploded at such high altitudes; so this is a first. Therefore, no one knows for sure what the phenomena from these

explosions will be. Each of the explosions will occur about midnight. Since the closest Island is Hawaii, which is 750 nautical miles away, we do not expect any collateral damage. Are there any questions?"

One Admiral said to Dr. Debus, "There is a Sand Island which is a short distance north of Johnston Island and this small Island is inhabited by many birds. I would like to know what is being done to protect these birds from the thermal pulse resulting from the explosion?"

Dr. Debus said, "Brigadier General Dawson will answer your question."

Brigadier General Dawson stood up and said, "The protection of the birds on Sand Island is of prime importance; therefore, I had LT. Vance set up smoke generators on Sand Island. At an appropriate time prior to the explosion, the smoke generators will be activated and will cover the whole island, regardless of the direction of the prevailing wind, in a dark non-toxic black smoke, which will provide adequate thermal protection for the birds on the Island. "

One of the generals asked, "Are there any contingency plans?"

Doctor Debus replied, "We have our standard contingency plans for handling the misfiring of a rocket. Such plans are available for review. We have fire line hoses connected to outlets at the two concrete revetments near the Rocket Launching Pad. Also, the station fire trucks are strategically placed in the vicinity of the Rocket Launching Pad. My personnel are fully qualified to operate the fire trucks. As far as a nuclear explosion contingency plan, I will let LT. Vance answered that question. At the Nevada test site, he has witnessed eight nuclear explosions."

I said, "There are no contingency plans per se. If the ***Gadget*** goes off while the Rocket is on the Island, the Island will disappear and so will we. If the ***Gadget*** goes off about 10 miles up, many of structures on Johnston Island which are above ground will be destroyed and there could be much thermal damage. So, this is really a 'GO' or 'NO GO' operation. Are there any questions?"

There were no questions for me, but one of the civilian scientists asked Mr. Wood about the timing signals.

Mr. Wood said, "All timing signals have been tested and are working perfectly."

There were no more questions, so Doctor Debus said, "Now I will take all of you on a tour of this Rocket Control Center."

I left the meeting and returned to the WET office. I sent Petty Officer Jones to the launch site is to make sure that everything is ready when all of the **VIPs** arrive.

About 1300, Petty Officer Jones came rushing into my office and said very excitedly, “Lieutenant, you better come quickly to the launch site because Doctor Debus and all the **VIPs** are on level four in the Tower and the Elevator will not move in a downward direction."

I immediately grabbed a can of silicone lubricant and white lithium grease from my desk, and then I ran to the launch site. I knew what was wrong. Previously we had decided to leave off some of the skin (siding) on the Tower so as to reduce the Construction Schedule; so, I knew that some of the Tower parts would be exposed to the ocean saltwater air. There is a spring-loaded metal arm which is attached to the tower and which is depressed downward by the elevator when the elevator is at its lowest level. When the Elevator goes up, this spring-loaded metal arm moves to the horizontal position. With the arm is in this horizontal position, the Elevator can go in a downward direction.

When I reached the Tower, I sprayed the silicone lubricant on the connection of the spring-loaded metal arm to the tower. The metal arm was in the downward position, and then I reinforced the metal arm to the horizontal position. Then I applied some white lithium grease to the connection. I also moved the metal arm up and down several times to make sure that it could move freely. Then I released the metal arm, and it moved to the horizontal position.

In a loud voice, I said, “Doctor Debus, the Elevator will work now, and you will be able to bring all of your guests down to the ground level."

Doctor Debus then operated the Elevator and brought all the **VIPs** down to ground level.

I returned to the WET office and sat at my desk reviewing all incoming messages. At this time a civilian entered my office, walked to my desk and said, “LT. Vance, my name is Don Henderson. You may not remember me. I was one of the paramedics in the dispensary, and I helped take care of you while you were there with an infected foot."

“Yes, I do remember you. You took excellent care of me. What can I do for you?"

“I understand that a paramedic is to be in the Rocket Control Bunker during the shots. I would like to volunteer to be that paramedic and stay with you in the Rocket Control Bunker during the shots."

“I certainly appreciate your volunteering. Do you have a family?"

“No, I do not have a family. I am single. Why do you want to know this information?"

“That is because, if the ***Gadget*** does not explode as planned, there is a possibility that those on the Island will just disappear and so will we. Do you still want to volunteer?"

"Yes, I still want to volunteer. This is something that is a 'first' and is very exciting, and I want to be a part of it. It will be something that I will remember the rest of my life."

"In view of what you have said, I will arrange for you to stay on the Island with me during the shots. When I move the Tower, I will need someone to assist me with the power cord which is attached to the Tower. When I move the Tower about 75 feet from the Rocket Launch Pad, the power cord will have to be unplugged and dragged to and plugged into a power outlet at the Tower Storage Pad. Would you be willing to do this for me?"

"If you arrange for me to stay on the Island during the shots, I will assist you with any task for which you need my help."

By the end of the day, July 26, all the **VIPs** had left the Island.

BUD'S MEMORIES OF EXPERIENCES
ON
OPERATION HARDTACK

PART 11

Starting on July 27th, evacuation of all unnecessary personnel had begun. Some of the people were going aboard ship and others were being flown to Hawaii.
During July 28th through July 30th, Doctor Baskin and his group mounted their instrumentation rockets on the eight concrete pad frameworks. These rockets were very thin and about 20 feet high. The purpose of the detectors in these rockets were to measure such things as overpressure and thermal, neutron, gamma, beta, and alpha radiation.

Doctor Hobbs and his group were busy preparing the rabbits for the eye tests. The rest of the scientific groups were running tests on their projects to make sure that all aspects would function flawlessly. Mike Benson and I were providing assistance as required to Doctor Debus and the other scientific organizations.

Most all of the nonessential personnel were evacuated on July 30th. Very early on July 30th, Doctor Debus had his crew start the operation of the two liquid oxygen plant trailers which each can produce about 10,000 pounds of liquid oxygen per day. A total of 36,000 pounds of liquid oxygen is needed. 25,000 pounds of which is the normal rocket capacity. The remaining 11,000 pounds is used to cool down the Rocket tank prior to loading.

Early on the morning of July 31, the rest of the nonessential personnel boarded a plane and flew to Hawaii.

As I remember, the personnel remaining on the Island were in two locations:

(1) Concrete Control Bunker:
- Doctor Debus and his civilian group which consisted of about 15 Electrical Engineers, scientists, and technicians.
- Don Henderson, a Paramedic
- Don Wood and his group from (EG&G)
- Lieutenant Vance, U.S. Navy, Civil Engineer Corps.

(2) Underground Island Dispensary:
Dr. Hobbs and 5 other scientists.

I was the only military person in the entire group. Of course, I was in my summer khaki uniform during the whole Johnston Island episode. I wore the full-length khaki trousers and a baseball type cap.

Part of Doctor Debus' crew was in the block house running tests on the Rocket system. Another part of his crew drove the alcohol semi-trailer which possessed a 3,000-gallon tank down the runway to where the drums of alcohol were stored. They pumped the alcohol from the drums into the 3,000-gallon tank; then they added the special water to the tank to make the mixture of 75% alcohol and 25% water. Once this was done, the crew drove the alcohol semi-trailer to the launch site. It was now dark and all of the perimeter lights were turned on. The alcohol trailer was driven close to the Launch Pad. Then the alcohol fuel hose was connected to the Redstone Rocket, and the alcohol mixture was pumped into the alcohol fuel tank near the top of the **Thrust Unit**.

Then two liquid oxygen storage and transporting trailers were driven and parked near the launch site. A liquid oxygen hose from each storage tank was connected to a "T" connection so that a single hose would run from "T" connection to the Redstone Rocket. Shortly after the pumping started, the liquid oxygen lines were covered with a thick layer of frost. When the pumping was finished, the liquid oxygen trailers were removed from the launch area. Then the hydrogen peroxide small service trailer was driven near the launch site. A hose was connected from the hydrogen peroxide container, 72 gallons, to the Redstone Rocket. When the pumping was completed, the service trailer was removed from the launch site.

After this, some of Doctor Debus' crew took dry ice in the Elevator and went up to the fourth level. They checked to make sure that there was about 18 pounds of dry ice in the inter-cooler and about 150 pounds of dry ice in the external drop tank. The dry ice is for cooling and controlling the temperature in the Redstone guidance system compartment located in the **Aft Unit**.

One of Doctor Debus' crew brought to the launch site 5,000 psi air compressor. Then Doctor Debus' crew pressurized the alcohol fuel tank, the hydrogen peroxide tank, and air system tank. The normal pressurization was 3,000 psi.

Sometime later, Doctor Debus said, "LT. Vance, you can now move the Tower away from the Launch Site."

I went to the Control Center Bunker and found Don Henderson, the Paramedic, and said, "I'm going to be moving the Tower; so I need to have you remove the chocks from the Tower wheels so that I can move the Tower. Also I'll need your help to unplug the Tower Power Cord from the Launch area when I move the Tower about 75 feet away from the Power Outlet at the Tower Storage Pad."

"I'm available. I'll be happy to go with you and take care of the Power Cord and the chocks."

While still at the Control Center Bunker, I turned off the Elevator Generator. When I arrived at the Launch Site, I removed the small Control Box from the Tower. Then I asked Mr. Fritz, one of Doctor Debus' men, to observe the clearance of the Redstone Rocket and the Tower

platforms while I was in the process of moving the Tower. I was fully aware that there was only a six-inch clearance between the Redstone Rocket and the tower platforms and that in the tip of the Redstone Rocket was a Nuclear ***Gadget***. I certainly didn't want to knock that Redstone Rocket over. I moved the Tower only about 12 inches when Mr. Fritz signaled me to stop. Mr. Fritz then checked all levels of the Tower to make sure that there was proper clearance, and then he signaled me to move the Tower again. I moved the Tower very slowly. When the Tower was clear of the Redstone Rocket, I moved the Tower as rapidly as possible to the Tower Storage Pad.

Now everyone was in the Control Center Bunker, except the six individuals in the Underground Dispensary. Inside the main room, was a television set on the West wall, so that those in the main room could watch the launching and the explosion on television. On part of the television screen, we could see the countdown number. When the countdown number was 15, I heard somebody say that there was going to be a delay due to a malfunction in the system. The length of the delay was an unknown period of time.

Then Doctor Debus came to me and said, " LT. Vance, I need you to move the Tower back around the Redstone Rocket as soon as possible because we are going to have to put more dry ice in the Rockets' Guidance Compartment."

"I'll move the Tower back around the Rocket as expeditiously as possible." I had never moved the Tower around the Redstone Rocket during the night time.

Don Henderson was nearby: so I said, "Don, I will need your help to move the Tower."

"I'll be right behind you all the way."

Right behind Don were members of Doctor Debus' crew.

I hit the "ON" switch for the elevator generator and the generator started up.

With Don's help, I quickly moved the Tower within about a foot from the Redstone Rocket. Then I called out to Mr. Fritz, one of Doctor Debus' crew, and I said," Mr. Fritz, I'm at the side of the Tower; so I cannot determine whether or not the Tower platforms are clearing the Rocket. I would appreciate it if you would stand in front of the Tower so that you can observe if the Tower platforms are clearing the Rocket."

"I'll be happy to do so, just remember to be very careful. If that Rocket gets knocked over, you and I will both be in deep trouble. Our careers will be over. "

I moved the Tower one foot from the Rocket, and at this time Mr. Fritz signaled me to stop. Mr. Fritz checked visually all levels of the Tower to make sure that there was adequate clearance between the Rocket and the Tower platforms. Then Mr. Fritz signaled me to continue. I slowly

moved the Tower forward about one foot, and then Mr. Fritz signaled me to stop again. The 100-foot-tall Tower is always subject to wind loads, and the upper part of the Tower is subject to slight horizontal deflections while moving. After checking the clearances, Mr. Fritz motioned for me to continue. I moved the Tower completely around the Redstone Rocket, and set the brakes. Don Henderson placed the wheel chocks to provide extra assurance that the Tower would not move.

Then Mr. Fritz and several other men loaded the Elevator with dry ice and move the elevator to level four. They put dry ice in the inner cooler of the Rocket and also in the external drop tank. Within a very short time they came down in the Elevator. Except for Fritz, the other men went to the Rocket Control Center Bunker.

Don Henderson removed the Tower wheel chocks, and Mr. Fritz motioned for me to start moving the Tower. I moved the tower about a foot, and Mr. Fritz signaled me to stop. Then after checking the clearance, Mr. Fritz signaled me to move the Tower. When the Tower was clear of the Rocket, I moved the Tower as rapidly as possible to the Tower Storage Pad. Then all of us went to the Rocket Control Center Bunker, and before I entered, I turned the Elevator Generator off. Once inside, I closed the blast door.

Those in the main room watched the television set which was on the West wall. We could see the Rocket on the Launch Pad. There was also a television set in the Rocket launch room, which was to the left, and there was another television set in the Rocket Flight Safety Officer's (MFSO) room.

Just before midnight, the countdown number on a television screen finally went to zero, and then we heard the loud noise of the Redstone Rocket engine being fired. We could watch the rocket rising into the air on the television set. A short time later we could hear the rocket motors of the Instrumentation Rockets being fired in a programmed sequence. As the Redstone Rocket climbed higher into the atmosphere, the Rocket Flight Safety Officer came running out of his office, and as he was entering Doctor Debus location, he yelled, "The Rocket is not programming to go over. It's going straight up!"

The Redstone Rocket was launched at 2347 and the explosion occurred at 2350. The explosion was to take place about five miles from Johnston Island at an altitude of 250,000 feet. The statement of the Rocket Flight Safety Officer really meant that the explosion was going to occur directly over Johnston Island. The explosion actually took place at a height of 252,000 feet.

When the explosion occurred. I was near the blast door, and I quickly opened it and went outside, with Doctor Debus right behind me. Initially, the light was so bright that it was difficult to see, but the brilliance quickly subsided. The rest the personnel were right behind Doctor Debus. Although it was about midnight, I could see the other end of Johnston Island as if the sun was shining. Doctor Debus and I were standing close together. We could see that the fireball was very large and was rising very rapidly. From the bottom of the fireball there appeared a brilliant Aurora

and purple streamers which spread towards the North Pole. We estimated this to be streams of beta radiation. We also saw a large red luminous sphere surrounding this fireball that appeared to be 200 or more miles in diameter. After some more of our observations, Doctor Debus and I shook hands, and then we both smiled and said in unison, “We did it!” At about this time the blast wave hit Johnston Island. It was very mild. Someone estimated that the over pressure was about 0.1 psi.

Later we entered the Rocket Control Center Bunker again. Doctor Debus mentioned that he was unable to contact General Luedecke, Commander of the Joint Task Force 7, or anyone else. We all felt that this was due to the beta ionization of the air. Doctor Debus recommended that we all go back to our living quarters and get some sleep because will have a busy day tomorrow.

On August 1, about 0900, I went to the Rocket Control Center Bunker to see Doctor Debus. When I walked in, Doctor Debus said that he had just received a radiocommunication from Joint Task Force 7 asking, “Are you still there?” I guess higher command wasn’t sure whether we were alive or dead. All the radio communications were now working.

We later learned that Admiral Parker, Armed Forces Special Weapons Project Office in the Pentagon, was very concerned about the personnel on Johnston Island because so many hours had passed with no word regarding the test.

Later in the day, planes started arriving with personnel. Much later other personal arrived by ship.

August 2, Petty Officer Jones came to the WET office and sat down in the chair by my desk. Then he said, “All of the Weapons Effects Test personnel went to the beach to watch the explosion. At first there was some concern because there was a delay in the time of the shot. Then suddenly we saw a huge fireball appear high above the horizon. Around the fireball was a large red luminous sphere which appeared to be 100 or more miles in diameter and was visible for about six minutes or more. When the phenomenon could no longer be seen, we went to the Weapons Effects Test office for a briefing. While there we learned that the communications to Johnston Island had been disrupted; so no one really knew what had happened to the those on Johnston Island. Also some of the other people on the Hawaiian Islands saw the fireball and went into a mild state of panic. Many people called the police thinking that the Hawaiian Islands were under attack or that maybe the end of the world was coming. As a result of the panic, the General Luedecke, Commander of the Joint Task Force 7, agreed to inform the Governor William Quinn when the second shot, the ‘**ORANGE**’ Shot, would be fired.“

About the first shot called, ”**TEAK**” shot, the Hawaii’s Newspaper stated that the United States detonated a hydrogen warhead over Johnston Island on Aug 1, 1958 and was visible 800 miles away. A 3.8 megaton warhead was detonated at an altitude of 48.3 Miles at 12:50 a.m.

Scientific Note On the Teak Explosion

In 0.3 seconds, the fireball diameter was 11 miles in diameter and it increased to 18 miles in diameter in 3.5 seconds. The fireball ascended about a mile per second. Surrounding the fireball was a very large red luminous spherical wave, arising apparently from electronically excited oxygen atoms produced by a shockwave passing through the low-density air.

After about a minute after the detonation, the fire ball had risen to a height of over 90 miles and then it was directly (line of sight) visible from Hawaii.

Unclassified

Within a second or two after the burst time of the "**TEAK**" shot, a brilliant Aurora appeared from the bottom of the fireball and purple streamers were seen to spread towards the North. Less than a second later, an Aurora was observed at **Apia**, in the **Samoan Islands** more than 2000 miles from the point of the burst, although at no time was the fireball in direct view. The formation of the **Aurora** is attributed to the motion along the lines of the earth's magnetic field of beta particles (electrons), emitted by the radioactive fission fragments.

** For more information- Refer to "***The Effects of Nuclear Weapons***" , Third Edition, 1977, Prepared and published by the UNITED STATES DEPARTMENT OF DEFENSE and the ENERGY RESEARCH AND DEVELOPMENT ADMINISTRATION. (Document is unclassified.)

"Jones, from what you have told me, I can presume that you had an exciting time and a pleasant few day enjoying the beaches and swimming in the ocean. Now we have a lot of work to do in such a short amount of time to get everything ready for the "**ORANGE**' Shot."

Within two days all personnel who had left the Island had returned. Everyone was working as rapidly as possible to get set for the **'ORANGE'** Shot, which was to be launched on 11 August. Mike Benson came to me and said that he had recharged all smoke generators on Sand Island; so the birds will be protected.

When I saw Doctor Baskin, I asked him, "Were the eyes of the rabbits damaged by the thermal radiation?"

"Yes, the rabbit's eyes suffered chorioretinal burns, that is to say permanent damage. Also there was a plane carrying rabbits that was 200 miles from the explosion. The eyes of these rabbits suffered chorioretinal burns. As a matter of interest, some of the people that were in the underground dispensary came out of the underground dispensary a little too soon and had to turn around and close their eyes for a few brief moments until the brightness diminished.

By September 3, the Redstone Rocket was set in place on the Launch Pad, and I moved the Tower around the Redstone Rocket.

On September 7, many non- essential personnel started leaving the Island.

About 2310 on September 11, the Redstone Rocket was ready to be launched; so I moved the Tower away from the Redstone Rocket and back to the Tower Storage
Pad and turned off the generator for the Elevator Tower. Then we once again entered the Rocket Control Bunker.

The ***Gadget*** was supposed to explode at a height of 143,000 feet and a horizontal distance of 21 nautical miles from the Launch Site. The actual height of the explosion was 141,000 feet. The Redstone Rocket was launched at 2327, and the burst occurred at 2330 Johnston Island time.

After the explosion, we all rushed outside as before. But this time things were different. Because of the natural cloud cover over Johnston Island at the time of the burst, direct observation of the "**ORANGE**" fireball was not possible.

Later we learned that the **Aurora** from the '**ORANGE**' Shot was less marked than from the "**TEAK**" Shot, but the Auroras as seen on **Apia** lasted about 17 minutes.

After the "**ORANGE**" Shot, my mission had ended, and within a couple weeks, I was headed back to Albuquerque, New Mexico, to be with my family again.

About three months after I returned to Albuquerque, New Mexico, I was presented with the Secretary of Navy Award for the outstanding manner in which I performed my mission on Johnston Island.

THE SECRETARY OF THE NAVY

WASHINGTON

The Secretary of the Navy takes pleasure in commending

LIEUTENANT ROBERT C. VANCE
UNITED STATES NAVY

for service as set forth in the following

CITATION:

"For outstanding performance of duty as Requirements Officer, Task Unit 7.1.3, Bikini Atoll, Eniwetok Proving Ground, from 26 February to 7 May 1958; and as the J-6 of Task Group 7.1, Johnston Island, T.H., from 18 May to 22 August 1958. Throughout these periods, Lieutenant Vance carried out his responsibilities with a high degree of professional skill. As Requirements Officer of Task Unit 7.1.3 during Operation HARDTACK, he was directly responsible for the expeditious completion of the extensive and complex construction required by the scientific projects of the Task Unit, and for the provision of the highly skilled service support needed by these projects. In accomplishing this formidable task, he overcame the seemingly insurmountable problems of control of priorities, management of manpower, and allocation of supplies and equipment. While serving as the J-6 of Task Group 7.1 during the 'Newsreel' phase of Operation HARDTACK, Lieutenant Vance skillfully managed the extremely difficult and precise construction effort of the entire Task Group. Under his personal guidance and supervision, the scientific stations were readied and in excellent condition for user occupancy three weeks prior to the most optimistic predicted date. Lieutenant Vance's achievements throughout reflect great credit upon himself and the United States Naval Service."

The Commendation Ribbon with Metal Pendant is authorized.

Thomas S. Gates

Secretary of the Navy

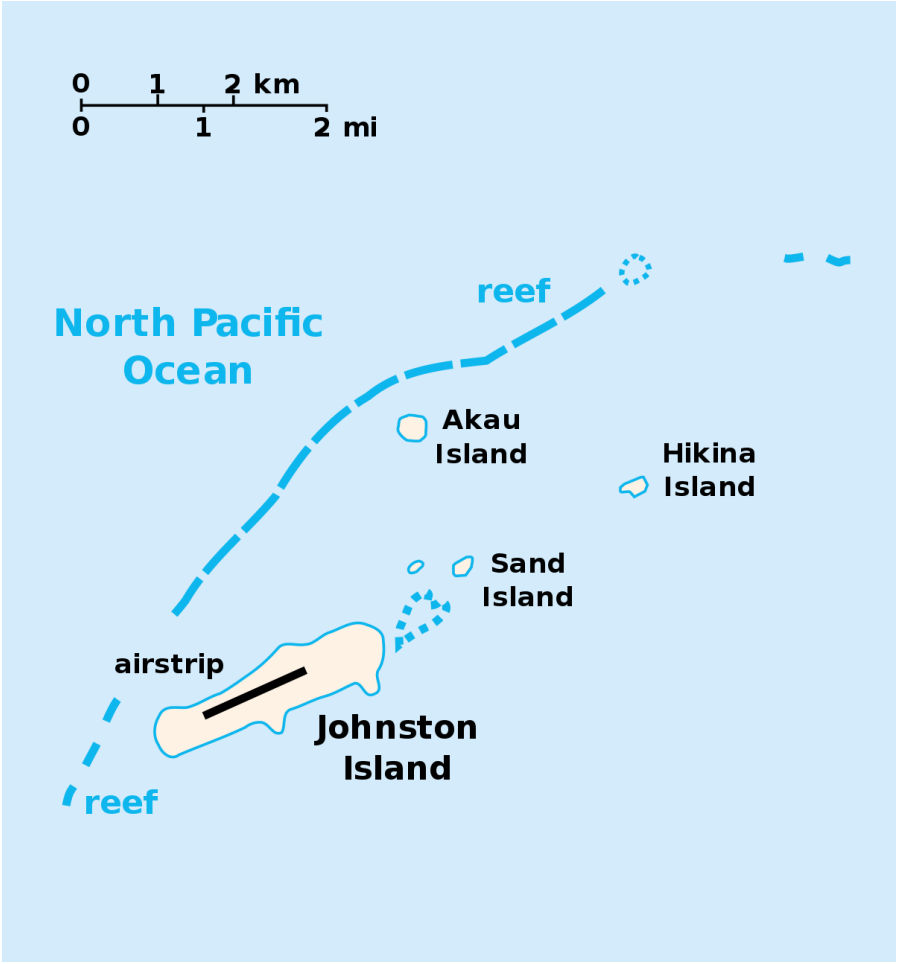

Johnston Island
August, 1958

A closer view of the launch site on the east end of Main St.

Aerial view of Johnston Island

The east end of Main St., just past where the bowling alley was. You can see the rocket standing in the lower center of the picture. The steel rails were still there when we left the island. The photo is from around 1958.


Growth of
Johnston Island
North
South
1962
1942
1958
1964
0 0.1 0.2 0.4
Nautical Miles

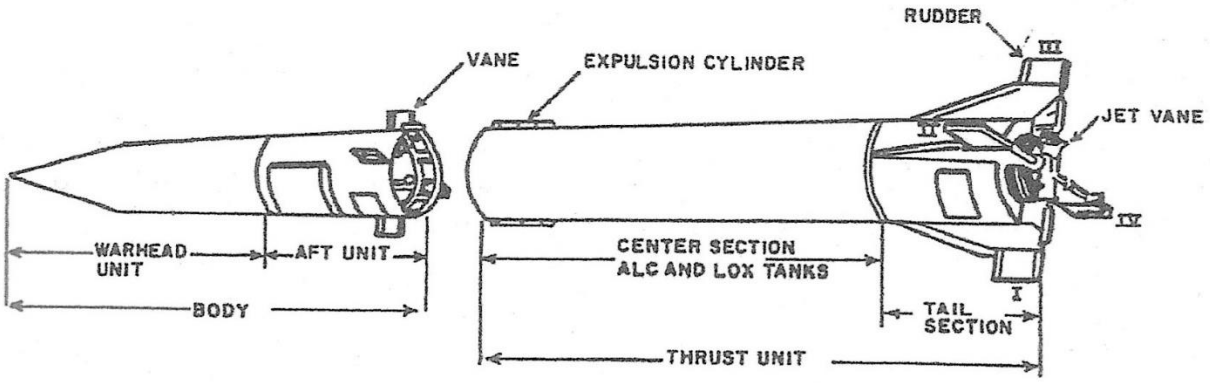

0 1 2 km
0 1 2 mi
North Pacific Ocean
reef
Akau Island
Hikina Island
Sand Island
airstrip
Johnston Island
reef

Redstone Rocket Height: 70 Feet

Redstone Rocket Diameter: 6 Feet

Tower Height: 100 Feet

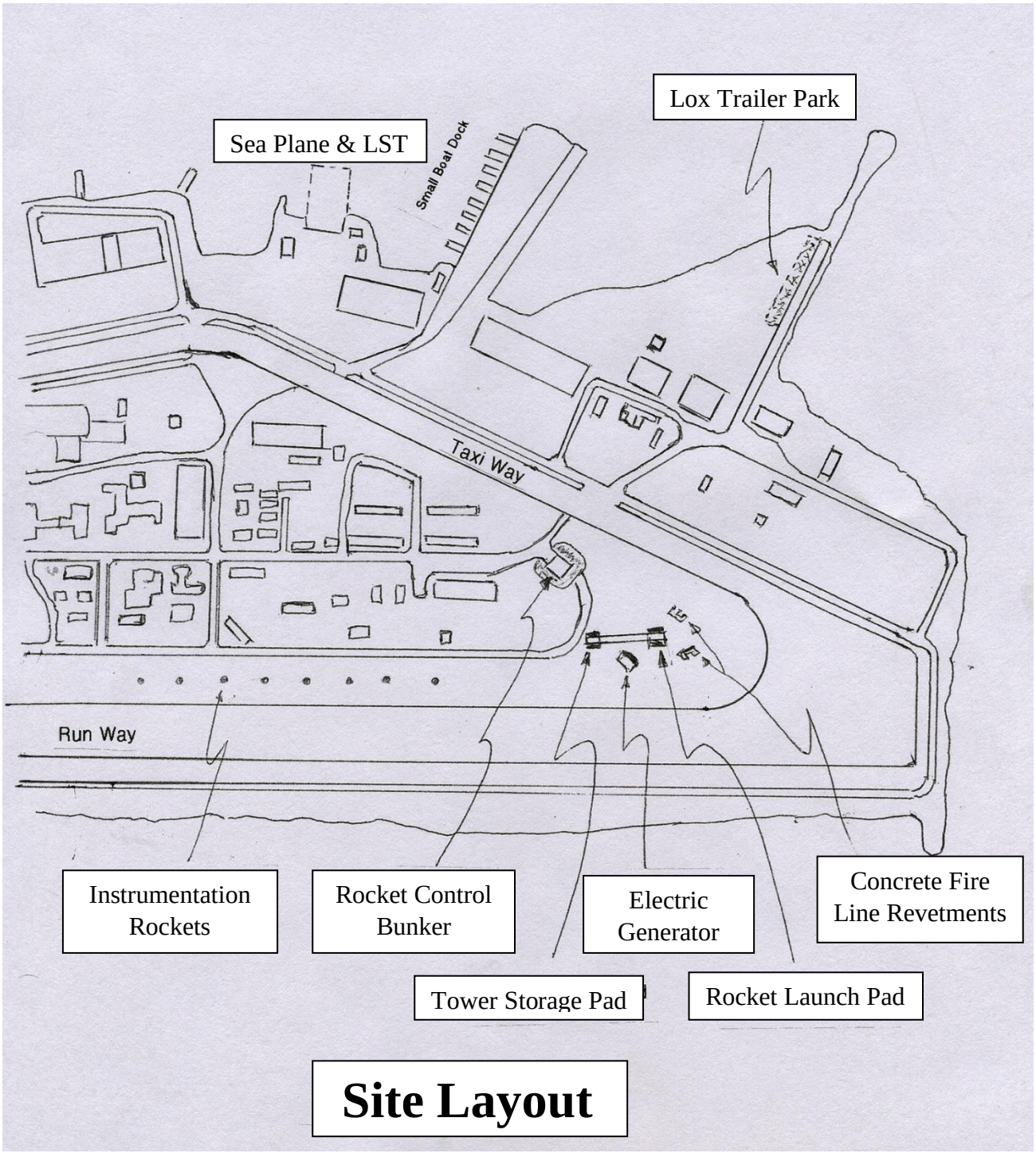
Aerial View of Tower and Redstone Rocket



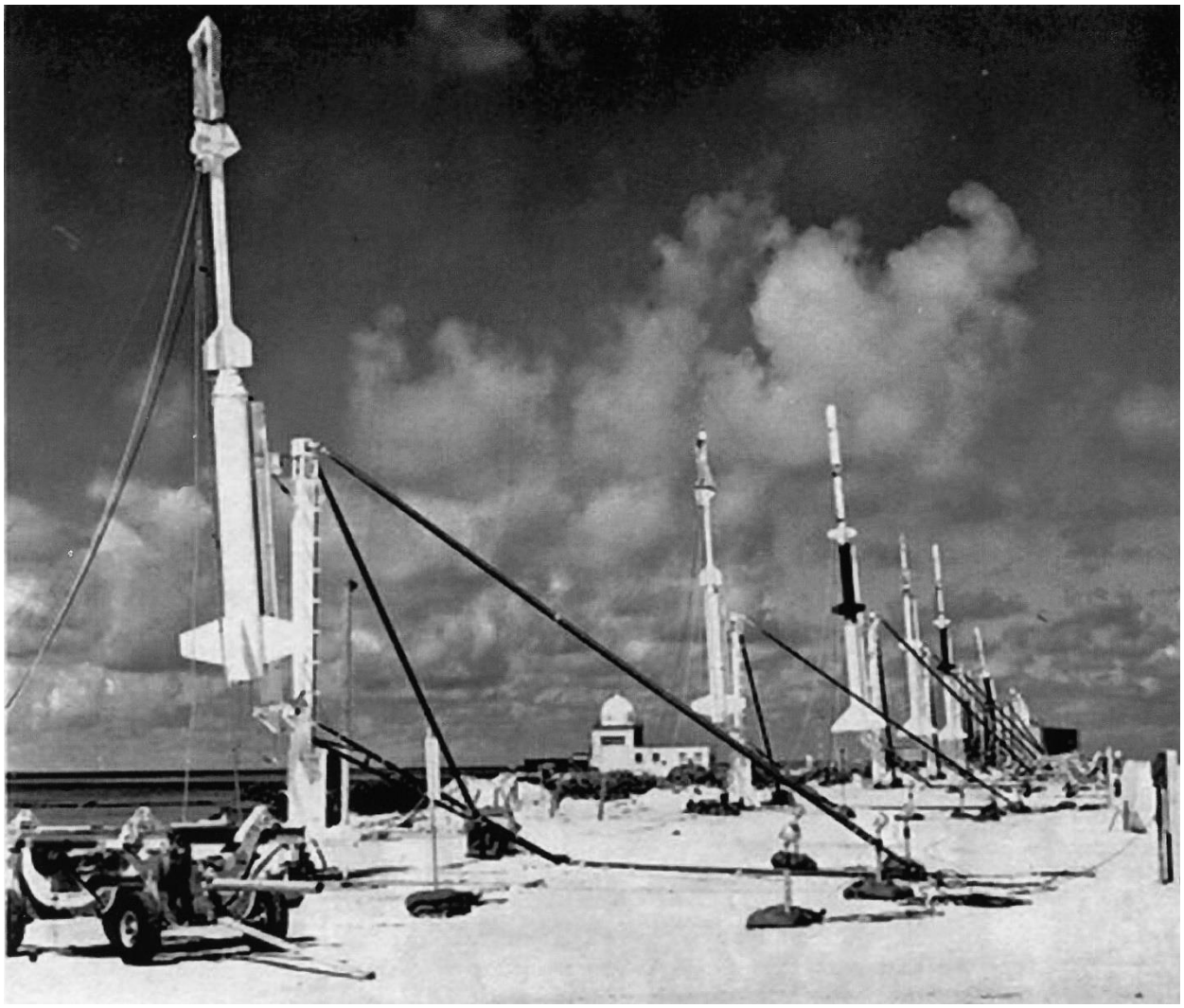
Components and nomenclature of the Redstone missile.

Johnston Island and Sand Island(This island was covered with birds, often referred to as “Bird Island”)

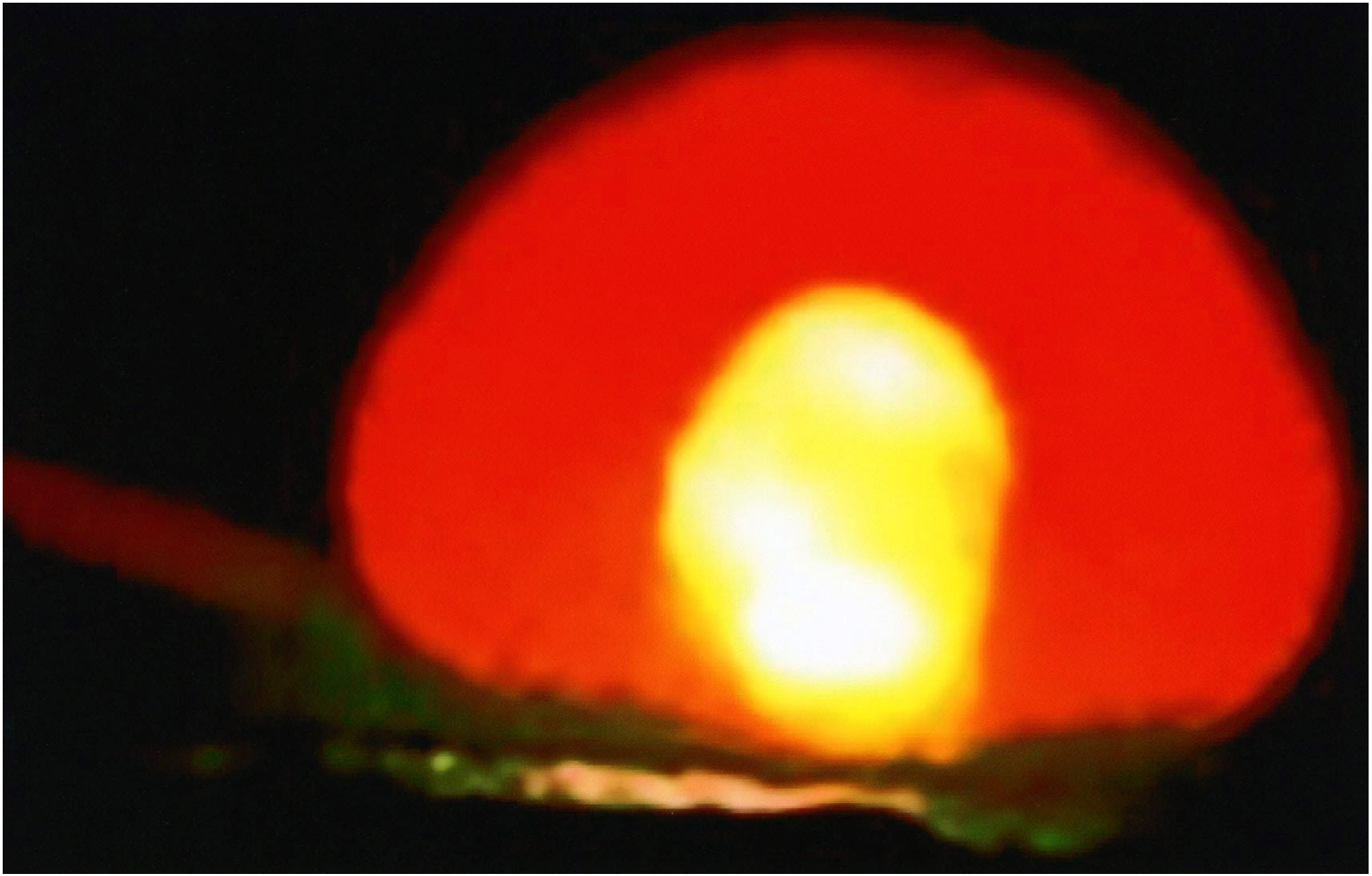
Sand Island


Lox Trailer Park
Sea Plane & LST
Small Boat Dock
Taxi Way
Run Way
Instrumentation Rockets
Rocket Control Bunker
Electric Generator
Concrete Fire Line Revetments
Tower Storage Pad
Rocket Launch Pad

Site Layout



Instrumentation Rockets, Used for Measuring Radiation and Components Such as: Thermal, Neutrons, Gamma, Beta, Alpha, Etc.



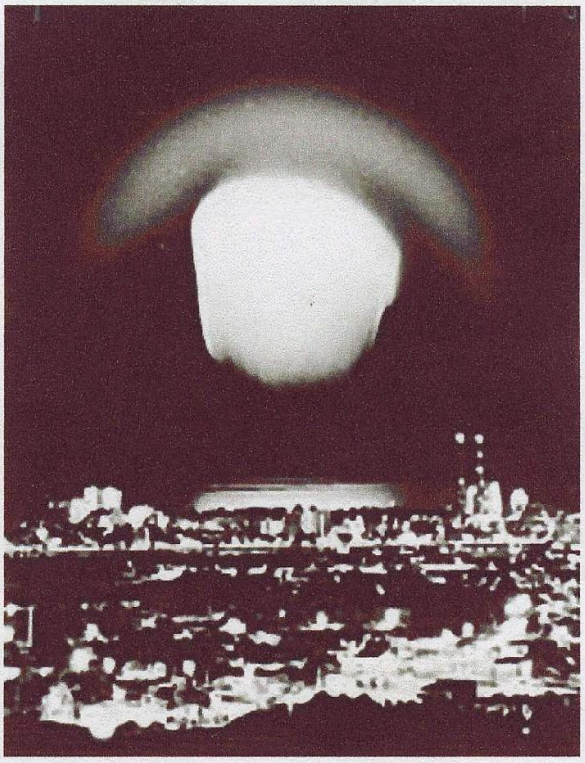
Teak Shot as Viewed From Hawaii 800 Miles Away

Posted on: Sunday, July 2, 2006

Nuclear tests

By Mike Gordon
Advertiser Staff Writer

Hawai'i residents were shoved into the nuclear age without warning when the United States detonated a hydrogen bomb over Johnston Island that was visible in Honolulu, some 800 miles away. It was the first of a dozen similar tests in the 1950s and 1960s.



The detonation of a 3.8 megaton warhead over Johnston Island in 1958 produced a fireball that lit up Honolulu. The tests at Johnston Island continued until late 1962.

Advertiser library photo

The blast on Aug. 1, 1958 — code-named Teak Redstone — was accomplished by sending a 3.8 megaton warhead to an altitude of 48.3 miles and detonating it at 12:50 a.m. But the flash awakened and terrified so many people — "many were emotionally disturbed by the phenomenon," Gov. William Quinn told military commanders — that advance notice was given for the next blast 11 days later.

The second blast, on Aug. 12, 1958, was greeted by anything but panic.

Thousands of residents found good locations along O'ahu's coast to view the explosion. They packed snacks and held "atomic parties" with the blast as the highlight.

Excerpt from “The effects of nuclear weapons. Credible nuclear deterrence, debunking "disarm or be annihilated". Realistic effects and credible nuclear weapon capabilities for deterring or stopping aggressive invasions and attacks which could escalate into major conventional or nuclear wars.”

'One observer, an Air Force lieutenant watching the sky around midnight that evening from his porch, recalled TEAK: "... it seemed to be a semi-circular fireball on the horizon... I just thought it was Honolulu or Pearl Harbor and I was dead." The Apia Observatory [which measured the auroral EMP or perhaps the MHD-EMP to be 4 times stronger than any due to solar flares] in Western Somoa approximately 2,000 miles to the south described the "... violent magnetic disturbance," which heralded "... the most brilliant maifestation of the Aurora Australis [Southen Lights} ever seen in Somoa." The resulting persistent ionisation of the low-density atmosphere cut high frequency communicatios with New Zealand for six hours. ... At the AFSWP's [Armed Forces Special Weapons Project; now the Defense Threat Reduction Agency] offices in the Pentagon, Admiral Parker grew concerned for the personnel on Johnston Island as hour after hour passed with no word regarding the test. Finally, some eight hours after TEAK had occurred, the word that all was well came ... The communications blackout worried others as well. Later AFSWP learned that one of the first messages received at Johnsto Island once communications was restored was: "Are you still there?". ...

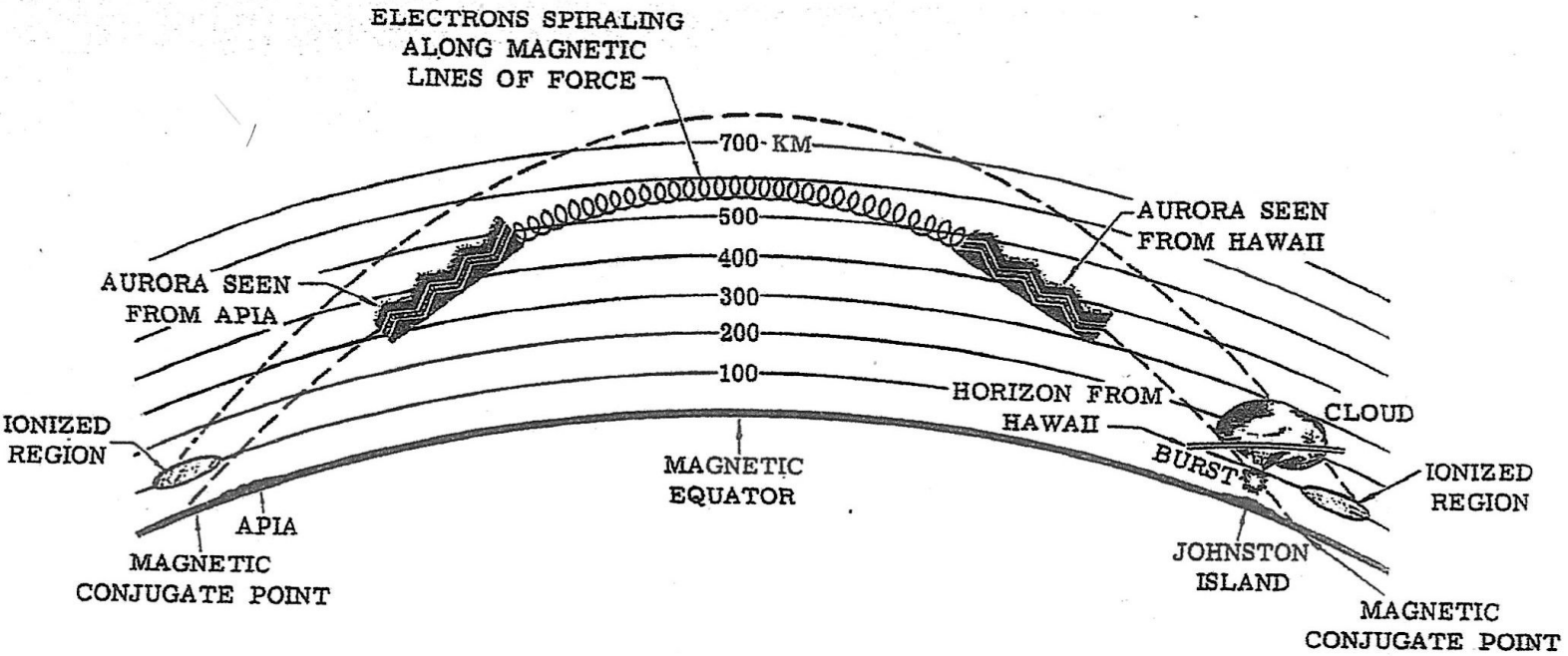


Figure 2.127. Phenomena associated with high-altitude explosions.

From the book

"**THE EFFECTS OF NUCLEAR WEAPONS**"

Prepared by

UNITED STATES DEPARTMENT OF DEFENSE

Published by the

UNITED STATES ATOMIC ENERGY COMMISION

April 1962

Page 83

Phenomena Associated with High-Altitude Explosions

C-124 Cargo Aircraft

Program B	William G. Sheehan, Capt, USN	Hq/AFSWP
Project 2.4	David L. Rigotti	CWL
Project 2.9	Manfred Morgenthau	CWL
Project 2.10	Manfred Morgenthau	CWL
Project 2.11	David L. Rigotti	CWL
Deputy Commander, Johnston	Harold Black, LtCol, USA	FC/AFSWP
Operations	Richard M. Elliott, LtCol, USMC	FC/AFSWP
Director for Delivery System	Roger Ray, Maj, USA	FC/AFSWP
Project 9.3a, b	Glenn P. Elliott, Col, USA	ABMA
Requirements	Robert C. Vance, LT, USN	FC/AFSWP
Logistics	Bill M. Saye, Capt, USA	FC/AFSWP
Communications	George M. Adams, LtCol, USAF	FC/AFSWP
Classification	Louis J. Cloutier, Capt, USAF	FC/AFSWP
Photography	Charles E. Campbell, Maj, USA	FC/AFSWP
Administration	Leroy A. Snodgrass, CWO, USA	FC/AFSWP
Program A	Joseph L. Delaware, LCDR, USN	FC/AFSWP
Project 1.7	Julius J. Meszaros	BRL
Project 2.6	Thomas D. Hanscome	NRL
Project 8.6	Charles J. Cosenza	WADC
Project 9.1d	Russell E. Loftman	CDC
Program B	Edward G. Halligan, LtCol, USA	FC/AFSWP
	C. Edward Lindberg, 2/Lt, USA	FC/AFSWP
Project 4.1	John E. Pickering, Col, USAF	Sch. of Av. Med.
Project 6.5	Theodore C. Viars	USASIGRDLAB
Project 6.6	Cecil W. Bastian	USASIGRDLAB
Project 6.10	George J. Gassman	AFCRC
Project 6.11	Lambert T. Dolphin, Jr.	SRI
Project 6.12	Stanley E. Bania	USASIGRDLAB
Project 8.1	Harold Korbel	NML
Program C	Jack G. James, LtCol, USAF	FC/AFSWP
	Harry W. Jones, Capt, USAF	FC/AFSWP
	Francis E. Shoup, 1/Lt, USAF	FC/AFSWP
Project 8.2	Richard M. Brubaker, Maj, USAF	AFCRC
Project 8.3	Jack H. Knight	EG&G
Project 8.4	Edd C. Y. Inn	NRDL
Project 8.5	Ralph Zirkind	BUAER
Project 6.13	Verne L. Lynn	MIT, Lincoln
TU-4 - Sandia Programs	Carroll B. McCampbell, Jr.	SC
Deputy Commanders	George P. Stobie	SC
	Clarence E. Ingersoll	SC
Scientific Advisor	Melvin L. Merritt	SC
Administrative Support		
A-1, 3, 4	Clifford A. Blossom	SC
A-6	Hugh R. MacDougall	SC
Photography	Henry G. Sweeney	SC
Program 32	Morgan L. Kramm	SC
	Charles G. Scott	SC
Scientific Advisor	Thomas B. Cook, Jr.	SC
Project 32.1	Richard L. Eno	SC
Project 32.2	John A. Beyeler	SC
Project 32.3	James L. Dossey	SC
Project 32.4	Charles G. Scott	SC

Program 21	Robert H. Goeckermann	UCRL
Project 21.1	Robert H. Goeckermann	UCRL
Project 21.2	Roger E. Batzel	UCRL
Project 21.3a	Edward H. Fleming, Jr.	UCRL
Project 21.3b	Edward H. Fleming, Jr.	UCRL
Project 21.4	Floyd F. Momyer, Jr.	UCRL
Project 21.5	Norman A. Bonner	UCRL
Program 22	Myron W. Knapp	UCRL
Project 22.1	William H. McMaster	UCRL
	Arnold F. Clark	UCRL
Project 22.2	Ervin C. Woodward, Jr.	UCRL
	Jack N. Shearer	UCRL
Program 24	Francis C. Gilbert	UCRL
TU-3 - DOD Programs	Kenneth D. Coleman, Col, USAF	FC/AFSWP
Technical Assistant	William R. Hammond, Maj, USAF	FC/AFSWP
Operations	John C. McClure, LtCol, USAF	FC/AFSWP
	John Tyson, LtCol, USAF	FC/AFSWP
Requirements Branch	William A. Mowery, LtCol, USA	FC/AFSWP
Administrative Office	Charles A. Swartzell, Capt, USA	FC/AFSWP
Reports Branch	Walter J. Miller	FC/AFSWP
Logistics	George P. Forsyth, Maj, USAF	FC/AFSWP
Communications	George M. Adams, LtCol, USAF	FC/AFSWP
	Edward M. Thornbury, Maj, USAF	FC/AFSWP
Timing	Thomas B. Windsor, Maj, USA	FC/AFSWP
Classification	Charles R. Moorhead, Jr., LtCol, USA	FC/AFSWP
	Frederick A. DePalma, Maj, USAF	FC/AFSWP
Deputy Commander, Eniwetok	Alfred H. Higgs, CAPT, USN	FC/AFSWP
Special Assistant, Navy	Corwin G. Mendenhall, CAPT, USN	FC/AFSWP
Special Assistant, A/C Mod	Jack G. James, LtCol, USAF	FC/AFSWP
Deputy Commander, Bikini	Harold Black, LtCol, USA	FC/AFSWP
Dir. for Delivery System	Roger Ray, Maj, USA	FC/AFSWP
Special Assistant, VHA	Harry C. Henry, LtCol, USAF	FC/AFSWP
Program 1	John W. Kodis, LtCol, USAF	FC/AFSWP
	Francis E. Shoup, 1/Lt, USAF	FC/AFSWP
Project 1.1	Elijah Swift, Jr.	NOL
Project 1.2	Peter Hanlon	NOL
Project 1.3	Elijah Swift, Jr.	NOL
Project 1.4	Andrew W. Patteson	ERDL
Project 1.5	Tom McMillian	NEL
Project 1.6	Lewis W. Kidd	SIO
Project 1.7	Julius J. Meszaros	BRL
Project 1.8	Lawrence M. Swift	SRI
Project 1.9	Edward H. Bultmann, Capt, USAF	AFSWC
Project 1.10	Jack T. Pantall, Jr., Capt, USAF	AFCRC
Project 1.11	Francis B. Porzel	ONR/ARF
Project 1.12	James F. Halsey	AFBMD
Project 1.13	James W. Winchester	ONR
Program 2	Gordon C. Facer, CDR, USN	FC/AFSWP
	John A. Chiment, Maj, USA	FC/AFSWP
Project 2.1	Michael M. Bigger	NRDL
Project 2.2	Michael M. Bigger	NRDL
Project 2.3	Evan C. Evans III	NRDL

LtCol. William Mowery, on the Eniwetok Atolls, was my Boss

ELECTROMAGNETIC PULSE

Nuclear explosions produce what is called the electromagnetic pulse (EMP).

After an EMP reaches its maximum in an extremely short time, the electric field strength falls off and becomes quite small after a few tens of microseconds. In spite of the short duration of the pulse, it carries a considerable amount of energy, especially if the exploding weapon has a yield in the megaton range. An EMP can cause serious damage to any system that relies on such equipment as: commercial electric generation and distribution systems, telecommunications, radio, radar, television, telephone, telegraphic systems, and electronic computers.

The **TEAK** shot (3.8MT) was exploded at a height of 252,000 feet. We did not notice that the electromagnetic pulse caused any damage on Johnston Island. Of course, in 1958, transistors were starting to be used but not to any great extent. Also, this was before the day of computers as they exist today. Electromagnetic pulse did not affect my vehicle, because not too long after the shot, I got in my vehicle and drove to my quarters. As far as I know, no one reported any damage from the electromagnetic pulse from Teak or Orange Shot.

The moratorium for above ground nuclear testing went into effect on November 1, 1958. Later the moratorium was changed so that some very high-altitude shots could be made in 1962 to determine what phenomena will occur at extremely high altitudes. Subsequently, once again the moratorium forbids above ground nuclear testing

On 9 July 1962, the USA **STARFISH PRIME** test exploded a 1.4 MT at a height of 249 miles in the Johnston Island area. The explosion occurred about 800 miles from Hawaii. This was the largest man-made nuclear explosion in outer space. The EMP damaged electronics in Honolulu, fused 300 streetlights on Oahu, set off about 100 burglar alarms caused the failure of a microwave repeating station on Kauai, which cut off the sturdy telephone system from the other Hawaiian Islands.

The worst effects of a at high altitude test occurred on 22 October 1962, when Russia exploded a 300 kt warhead near Dzhezkazgan at an altitude of 180 miles. The EMP fused 355 miles of overhead telephone lines with the measured current of 2,500 A, started a fire that burned down Kzraganda power plant, and shut down 621 miles of shallow
buried power cables between Aqmola and Almaty.

Since the recognition of an EMP pulse years ago, industry has been hard at work trying to provide shielding for utilities and equipment to minimize the effects of any EMP.

lw 4/30/2020

Kurt H. Debus

Debus' official portrait as KSC director

Kurt H Debus on the right and Werner von Braun on the left at a Saturn V test vehicle rollout in 1966.

Doctor Kurt H. Debus

A short biography prepared by Bud Vance

Born: November 29, 1908 Frankfurt, Germany
Died: October 10, 1983 (74) Rockledge, Florida, USA

In 1939 he received a Doctor's Degree
Field - Electrical Engineering. Darmstadt. Germany

During World War II in 1942, the German government appointed Dr. Wernher von Braun to head a group of engineers, scientists and technicians to work on the development of an A4 rocket and later a V2 rocket at Peenemunde, Germany.

Dr. Wernher von Braun's dream was to develop rockets for space flight. One of the scientists working with Doctor Wernher von Braun was Doctor Kurt H. Debus. He was the director of the V- Flight Test.

In 1944, Doctor von Braun objected to the V2 rockets being launched in attacks on civilian populations of London and Paris. Dr. von Braun's interest in rockets was specifically for the application of space travel, not for killing people. As a result of his objections, Dr. von Braun, Dr. Kurt Debus and other top aides were imprisoned on espionage charges by the Gestapo Chief, Heinrich Himmler, who then took over the Rocket Program. Dr. Wernher von Braun was accused of delaying or sabotaging the weapons program. However, eventually a Professor, Dr. Dornberger, was able to convince Hitler that the V2 rocket program could not succeed without Dr. von Braun. Hitler personally released von Braun and his group from prison. However, Hitler stated that von Braun and his group would be exempt from prosecution and death as long as the rocket program was productive and showed progress.

In 1945 when the war was ending, Dr. Wernher von Braun, Dr. Kurt Debus and 500 members of the rocket team surrendered willing to the American Army troops. They had with them the V2 plans and test vehicles.

United States

Dr. Wernher von Braun, Dr. Kurt Debus and the rest of the scientists were sent to an Army base at Fort Bliss, Texas where they worked on rockets for the U.S. Army. The rockets were launched at White Sands Proving Grounds, New Mexico.

In 1950, Dr. von Braun and his team were transferred to Huntsville Alabama. Dr. Wernher von Braun became Director of the Development Operations Division of the Army Ballistic Missile Agency (ABMA), named Dr. Kurt H. Debus as Head of the Experimental Missile's Firing Branch. At this time, Dr. Von Braun, Dr. Kurt Debus and the team developed the Redstone Rockets, and others.

On October 4, 1957 Russia launched its first satellite, called **"Sputnik."** This meant that the United States was behind the Russians in the space race.

In November 1957, Army General McDarius asked Dr. von Braun if he could modify the Redstone Rocket so as to put a satellite into orbit within three months. Dr. von Braun said he could do it.

Dr. Braun and Dr. Kurt Debus spent a lot of time modifying the Redstone Rocket. (About 800 modifications would be required to the Redstone Rocket - especially adding a 6-foot extension to the combustion chamber.)

Then on January 31, 1958, the modified Rocket was launched under the direction of Dr. Kurt Debus, and the first USA satellite was in orbit. This rocket was called, Vanguard 1.

Early in 1958, Dr. Wernher von Braun assigned Dr. Kurt H Debus to go to Bikini and launch two Redstone Rockets, each carrying a large Nuclear ***Gadget***. One shot was to be called **"TEAK"** and the other shot was to be called **"ORANGE."** This was to be a first because no Large Nuclear ***Gadget*** had ever launched by a Rocket and had been exploded at such a high altitude. No one was sure what the phenomena would be for such an explosion. The launching facilities were about 95% complete on Bikini when the top commanders determined that there was a possibility that some Islanders, about 100 or 200 miles away from Bikini, could have their eyes damaged by the thermal pulse of the fire ball. Therefore, the Rocket Launching Facilities had to be rebuilt on Johnston Island which is about 800 miles west from Hawaii. Since a number of nations were meeting and discussing a moratorium on aboveground nuclear testing, it was felt that the launching facilities would have to be completed in 2 ½ months in lieu of four months to ensure that both shots could be fired before any moratorium could be established.

Doctor Debus, Lieutenant Robert C (Bud) Vance, Civil Engineer Corps, U.S. Navy, who was in charge of getting the facilities built, and a Manager for Homes and Narver, an Engineering Firm, worked diligently together and were able to determine how to construct the facilities in 2 ½ months in lieu of four months. The Home and Narver Manager did not stay on the Island during the Two Shots.

Those staying on the Island during the Shots were aware that, if the ***Gadget*** exploded while it was still on the Island, then the Island would disappear and all of those on the Island would disappear. If the ***Gadget*** exploded at a height of 10 miles in lieu of 50 miles (the designated height of the shot), then all those on the Island would probably be killed by the blast and the thermal.

Dr. von Braun visited Johnston Island and conferred with Doctor Debus on the Saturday before the first shot. Dr. von Braun did not remain on the Island during the **"TEAK"** or "**ORANGE**" Shorts.

In spite of the frantic rush to get the two shots off because some Nations were thinking above a Moratorium on above ground nuclear testing, Doctor Kurt Debus, through his thoroughness, great knowledge, skill and expertise, successfully launched both the **"TEAK"** Shot (July 31 ,1958) and the **"ORANGE"** Shot (September 11, 1958). Of course, there was no local fallout.

In July 1958, President Eisenhower signed legislation establishing NASA, and Doctor Wernher von Braun was transferred to the new agency. In 1960 Dr., von Braun was named the **Director of NASA's George C. Marshall Space Flight Center**.

Also Dr. Wernher von Braun's longtime friend and associate, Doctor Kurt H Debus, was transferred to NASA in 1960. Starting in 1961, Dr. Kurt H Debus directed the design, development and construction of NASA's Saturn V Rocket Launch Facilities at the north end of Cape Canaveral and adjacent Merritt Island. The name of **"Cape Canaveral"** was changed to the **Kennedy Space Center.**
In 1962, Dr. Kurt H. Debus became **Director of the Kennedy the Space Center.**

On April 12, 1961 Soviet cosmonaut Yuri Gagarin became the first person to fly in space.

At the Marshall Space Flight Center, Dr. von Braun continued developing rockets to propel astronauts into space. He worked closely with his friend and associate, Dr. Kurt Debus, who was **Director of the Kennedy Space Center** and who was the great Rocket Launching expert.

On May 5, 1961, Dr. Kurt Debus and his group launched the rocket
Freedom 7, Mercury Capsule, which carried Alan Shepherd into space.

On February 20, 1962, Dr. Kurt Debus and his group launched another Freedom 7, Mercury Capsule carrying John Glenn into space, and he orbited the earth.

Dr. Wernher von Braun developed the Saturn V Rocket, the super booster that propelled the Apollo spacecrafts to the Moon. Dr. von Braun and Dr. Kurt Debus conferred often concerning the design of the Saturn V Rocket. This was important because Dr. Kurt Debus was the one who would be responsible for launching the Saturn V Rockets.

Dr. Kurt Debus launched the Apollo 11 spacecraft which enabled the Neil Armstrong to walk on the Moon on July 20, 1969.

Under Dr. Kurt Debus, NASA conducted launching of many Rockets, including 13 Saturn V rockets.

There is a small crater on the far side of the Moon that is named for Dr. Kurt Debus. Also, the Conference Center at the Kennedy Space Center Visitor Complex is named **The Kurt Debus Conference Center**.

In 1969, Dr. Kurt Debus was inducted into the National Space Hall of Fame.

Each year, the National Space Club of Florida presents its annual Debus award to recognize significant aerospace achievements in Florida. This was started in 1990.

Wernher von Braun

Dr. Wernher von Braun in his office at Marshall Space Flight Center with a display of model rockets

In this photo German rocket expert Wernher von Braun was heading to Nasa's Marshall Space Flight Center with President Kennedy in 1960. Kennedy is asking von Braun if he can build a rocket that will put men on the moon in this decade. The answer was yes. This meeting played a crucial role in JFK's push towards space.

Pictures of Dr. Wernher von Braun when he came to Johnston Island on the Saturday before the shot so that he could meet and discuss with Dr. Kurt Debus the status of the launching of the Redstone Rocket. Dr. Von Braun did not remain on the island during the launching.

The pictures show Dr. Wernher von Braun inspecting one of 4 instrument pods which will record the some of the phenomenon of the explosion. These pods will be attached to the Redstone Rocket and each pod will be ejected from the rocket at different altitudes.

Doctor Wernher von Braun

A brief biography prepared by Bud Vance

Location: Germany

Wernher von Braun was born March 23, 1912 in Wirsitz, Provinz Posen, Germany. He died June 16, 1977 in Alexandria, Virginia, United States when he was 65 years old. The cause of his death was Pancreatic Cancer.

At age 10, he was more interested in extracurricular activities than science. He flunked mathematics and physics, but he excelled in languages and music. He played the piano and the cello. Young von Braun could play pieces from the Masters, such as Bach and Beethoven, from his memory. As he grew older, he developed an intense interest in astronomy and the theories of space flight. This propelled him into studying and excelling in mathematics and physics.

While he was still a student, he joined the German Society for Space Travel and worked with Herman Oberth. Herman and von Braun successfully launched two rockets to reach heights of about 1.5 miles. They did not launch anymore rockets because the German government forbade rocket tests. If von Braun wanted to continue working with rockets, he would have to do it through the military.

In 1934, he received his Doctorate in physics from the University of Berlin. At this time, he was just 22 years old.

The German government appointed Dr. Wernher von Braun to head a group of engineers, scientists and technicians, and he was to work on building rockets. His dream was to develop rockets for space flight. One of the scientists working with Doctor Wernher von Braun was Doctor Kurt H. Debus. Dr. Wernher von Braun and his group started developing the V2 rocket in 1942.

In 1944, Dr. von Braun objected to the V2 rockets being launched in attacks on civilian populations of London and Paris. Braun's interest in rockets was specifically for the application of space travel, not for killing people. As a result of his objections,
he and Dr. Kurt Debus and other top aides were imprisoned on espionage charges by the Gestapo Chief, Heinrich Himmler, who took over the rocket program

Dr. von Braun was accused of delaying or sabotaging the weapons program. However, afterwards Dr. Dornberger told Hitler that the rocket program could not succeed without Dr. von Braun. Hitler personally released von Braun and his group from prison. Hitler said that von Braun and his group would be exempt from prosecution and would not be killed as long as the V2 rocket program was productive.

In 1945 when the war was ending, Dr. Wernher von Braun, Dr. Kurt Debus and 500 members of the rocket team surrendered willing to the American Army troops. They had with them the V2 plans and test vehicles.

Location: United States

Dr. Wernher von Braun, Dr. Kurt Debus, and the rest of the scientists were sent to an Army base at Fort Bliss, Texas where they worked on rockets for the U.S. Army. The rockets were launched at White Sands Proving Grounds, New Mexico.

In 1950, Dr. von Braun and his team were transferred to Huntsville, Alabama. Dr. Wernher von Braun became Director of the Development Operations Division of the Army Ballistic Missile Agency (ABMA). Dr. von Braun named Dr. Kurt H. Debus as Head of the Experimental Missile's Firing Branch. At this time, von Braun and his team developed such rockets as the Redstone, Jupiter -C, Explorer 1 and the Pershing.

Dr. Wernher von Braun gave many lectures and wrote many articles about space travel. In 1952 Dr. von Braun published his concept of a manned space station. He talked about going to the Moon and also to Mars. At this period of time, so many scientists just thought he was a crazy dreamer.

On October 4, 1957 Russia launched its first satellite, called "**Sputnik**." This meant that the United States was far behind the Russians in the space race.

In November 1957, Army General McDarius asked Dr. von Braun if he could modify the Redstone Rocket so as to put a satellite into orbit within three months.
Dr. von Braun said he could do it. Dr. Braun and Dr. Debus spent a lot of time modifying the Redstone Rocket (800 modifications were required), and on January 31, 1958, the modified Redstone Rocket was launched, and the first USA satellite was in orbit. This rocket was called, Vanguard 1.

Early in 1958, Dr. Wernher von Braun assigned Dr. Kurt H Debus to go to Johnston Island and launch two Redstone Rockets, each carrying a large nuclear Gadget. One Gadget would be exploded at 50 miles above Johnston Island. This was a first because this had never been done before, and no one was sure what the phenomena would be when a large Nuclear Gadget explosion occurred at such a high altitude.

Dr. Kurt Debus successfully launched first shot on July 31, 1958, and the second shot on September 11, 1958. Dr. von Braun visited and conferred with Doctor Debus on the Saturday before the first shot, **(TEAK)**. Dr. von Braun did not remain on the Island during the two shots.

In July 1958, President Eisenhower signed legislation establishing NASA, and Doctor Wernher von Braun was transferred to the new agency. In 1960 Dr. von Braun was named the Director of NASA's George C. Marshall Space Flight Center.

Doctor Wernher von Braun's longtime friend and associate, Doctor Kurt H Debus, was also transferred to NASA in 1960. Starting in 1961, Dr. Kurt H Debus directed the design, development

and construction of NASA's Saturn launch facilities at the north end of Cape Canaveral and adjacent Merritt Island. The name of Cape Canaveral was changed to the Kennedy Space Center. In 1962, Dr. Kurt H Debus became the Director of the Kennedy Space Center.

On April 12, 1961 Soviet cosmonaut Yuri Gagarin became the first person to fly in space.

At the Marshall Space Flight Center, Dr. von Braun continued developing rockets to propel astronauts into space. He worked closely with his friend and associate, Doctor Kurt Debus, who was director of the Kennedy Space Center and was a great expert in Rocket Launching.

On May 5, 1961, the Rocket Freedom 7, Mercury Capsule, carried Alan Shepherd into space.

President Kennedy wanted the U. S. to take the lead in the space race. At a Joint Session of Congress on May 25, 1961 President Kennedy said, "First, I believe that this nation should commit itself to achieving the goal, before this decade is out, of landing a man on the Moon and returning him safely to earth." He asked Congress for the funding to accomplish this, and Congress authorized the funding.

On February 20, 1962, John Glenn was launched into space and orbited the earth on board the Freedom 7, Mercury capsule.

On September 11, 1962, President Kennedy visited the Marshall Space Flight Center and met with Dr. Wernher von Braun. President Kennedy asked if Dr. von Braun could, within a decade, develop a Rocket which could put men on the Moon. Dr. von Braun stated that he could and would do this.

Dr. Wernher von Braun developed the Saturn V launch vehicle, the super booster that propelled the Apollo 11 spacecraft to the Moon on July 20, 1969, thereby permitting Neil Armstrong to walk on the Moon. Dr. von Braun's Saturn rockets eventually took 27 Americans in space and 12 who walked on the lunar surface. Also Doctor von Braun was instrumental in developing the Saturn 1B rocket, which lifted Skylab, the world's first space station, into orbit.

In 1975, Doctor Wernher von Braun received the National Medal of Science. Doctor Wernher von Braun is considered as "The Father of Space Flight." Also one NASA person said that without a doubt, Dr. Wernher von Braun is the Greatest Rocket Scientist in History."

LIST OF PERSONNEL

REAL NAMES

Lieutenant Colonel William (Bill) Mowery, U. S. Army

Lieutenant Robert (Bud) Vance, U.S. Navy, Civil Engineer Corps

Doctor Kurt Debus

Doctor Wernher von Braun

FICTITIOUS NAMES ***

Brigadier General Dawson, U.S. Army (Commander of Johnson island)

Colonel Jamison, U.S. Army (Chief of Staff)

Major Devlin (Air Force officer in charge of the control tower and air operations)

Master Sergeant Jim Russell (U.S. Air Force)

Petty Officer Jones (Assistant to Lieutenant Vance)

Mr. Mike Benson (Construction Manager, Homes and Narver) (H&N)

John Lawrence (H&N Foreman)

James Jensen (H&N Electrician)

Bob Wood (EG&G) In charge of the timing signals

Mr. Ken Strickland (Safety Officer, Atomic Energy Commission)

Doctor Hobbs - Eye Specialist

Doctor Baskins - Instrumentation Rockets

Mr. Hans Fritz (One of Doctor Debus' crew)

Don Henderson (Paramedic)

*** I cannot remember the real names of those who were with me on Johnston Island so long ago; so I have to use fictitious names.

Calendar 1958

January

S	M	T	W	T	F	S
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	

February

S	M	T	W	T	F	S
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	

March

S	M	T	W	T	F	S
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	31					

April

S	M	T	W	T	F	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30			

May

S	M	T	W	T	F	S
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

June

S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30					

July

S	M	T	W	T	F	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

August

S	M	T	W	T	F	S
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31						

September

S	M	T	W	T	F	S
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30				

October

S	M	T	W	T	F	S
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	

November

S	M	T	W	T	F	S
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30						

December

S	M	T	W	T	F	S
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

"This Week" - The Salt Lake Tribune
July 18, 1965

Why I Believe

Wernher von Braun talks about science and God

Science and faith are the two dominate forces in this century. We must try to understand their nature if we are to comprehend some of the most serious problems of the era in which we live.

The mainspring of science is curiosity. Since time immemorial, there have always been men and women who felt a burning desire to know what was under the rock, beyond the hills, across the oceans. This restless breed now wants to know what makes an atom work, through what process life reproduces itself, or what is on the far side of the moon.

But also, there would not be a single great accomplishment in the history of mankind without faith. Any man who strives to accomplish something needs a degree of faith in himself. And whenever he takes on a challenge that requires more moral strength than he can muster with his own limited mental and spiritual resources, he needs faith in God.

One of the most crucial issues of our time lies in the fact that modern science, along with miracle drugs and communications satellites, has also produced nuclear bombs. It cannot be denied that science has failed to provide a practical answer on how to cope with them. As a result, science and scientists have often been blamed for the desperate dilemma in which mankind finds itself today.

Science, by itself, has no moral dimension. The drug which cures when taken in small doses may kill when taken in excess. The nuclear energies that produces cheap electrical power when harnessed in a reactor may kill when abruptly release in bomb. That it does not make sense to ask a scientist whether his poison or his

nuclear energy is "good" or "bad" for mankind.

And so, the realization that science is unable to control the possible abuse of the forces it has made available, has led hundreds of millions in the world to a new interest in religion. The religious revival shows that there is a widespread realization that in the nuclear age man has a desperate need for stronger ethical control of the immeasurable physical forces he has unleashed.

But many people find the churches, those old ramparts of faith, badly battered by the onslaught of three hundred years of scientific skepticism. This has led many to believe that science and religion are not compatible, that "knowing" and "believing" cannot live side by side.

Nothing could be further from the truth. Science and religion are not antagonists. On the contrary, they are sisters. While science tries to learn more about the creation, religion tries to better understand the Creator. While, through science, man tries to harness the forces of nature around him, through religion he tries to harness the forces of nature within him.

Science may not have a moral dimension. But I am certain that science , in its search for new insights into the nature of the creation, has produced new ethical values of its own. Most certainly science has fostered veracity and humility. Again, it is a mark of all true science that its findings are valid and objective for all time and all peoples; that these findings demand unconditional acceptance and that once proved correct, they are universally embraced. If man has ever come close to finding an answer to Pontius Pilate's question, "What is truth?", science has shown the way. Personally, I believe in the ultimate victory of truth. I am confident that to the extent that we shall learn more about nature, we shall not only arrive at universally accepted scientific findings, but also at a set of universally accepted rules and standards of human behavior.

The materialists of the nineteenth century and their Marxist heirs of the twentieth, tried to tell us that, as science gives us more knowledge about the creation, we could live without faith in a Creator. Yet so far, with every new answer, we have discovered new questions. ***The better we understand the intricacies of the atomic structure, the nature of life, or the master plan for the galaxies, the more reason we have found to marvel at the wonder of God'***

creations.

But our need for God is not based on awe alone. Man needs faith just as he needs food, water or air.

With all the science in the world, we need faith in God, whenever faith in ourselves has reached its limit.

July 18, 1965