Good afternoon. I’m Manuel Barbeito, and I’ve been a biosafety officer my entire career, which spanned from [clears throat] 1956 to the present. I wish to thank Dr. Hawley, President of ABSA and the Council for inviting me to the 50th Biological Safety Conference as a, and for producing this video in lieu of my presence [clears throat].

Joe Kozlovac is to be commended for his effort in organizing the Historical Roundtable on the contributions of to, of biosafety to the profession we enjoy. I will attempt, uh, as requested, to share with you several of the contrimu, contributions made in biosafety by the safety staff of Ft. Dietrich and others involved in supporting roles.

Camp Dietrich, Ft. Dietrich was the home of the U.S. Biological Warfare Laboratories from March 10, 1943 until July 1, 1976. A safety program was immediately established by, uh, Lieutenant Colonel Ira Baldwin and one of his key ingredients was to appoint safety. Part of that group was Lieutenant Edward Hanell who arrived at Dietrich in early March 1943. Immediately as set of rules and regulations were established in late 1943. During the war years, sixty occupational illnesses occurred which was highly success, indicates a highly successful program when you consider the absence of biological safety knowledge and lack of sophisticated equipment at that time. In 1946, Dr. Wedum joined the Dietrich group and became, eventually, the safety director focussing all of his efforts on those elements. His philosophy, which we can all be thankful for, was that as a Government employee, his function was to serve and assist the public and enhance the welfare of the Country. The top secret designation prohibited the publication of material from the war years. And then, in 1949, a hundred plus scientific papers were published. Under Dr. Wedum’s guidance, for the safety group, he was adamant on trying to get material cleared, which was a hassle in itself, so that others may enjoy what we were finding out.

In the ‘60’s, the, uh, biosafety colleagues bestowed onto Dr. Wedum the title Father of Micro-biological Safety. This he cherished as an honor, above all other awards bestowed unto him during his career.

What were some of the contributions? And, I’m only going to give you a few highlights with a little detail and try to get through this as quickly as possible. In 1945, they established various safety committees and one of these was a unit safety representative which Jerry Tullis, uh, served in that capacity. The one thing that set Dietrich apart from other organizations was that there was a no fault finding or punitive action, uh, could be taken against employees related to accidents, injuries, illnesses or property damage. This was unheard of at that time, and still today, it stands alone. The safety committees, uh, were to inspect each and every organization [unintelligible]. Another element of the safety group at Dietrich was that they had an elaborate safety training program for every employee on post. In the 1940’s, there was a safety exhibit developed to show safe laboratory manipulations and equipment developed at Ft. Dietrich. This was shared by everyone in the, uh, communities at scientific meetings in the U.S. and Canada.

What was the supporting role of Dietrich to the U.S. public health service? In 1960’s, Dr. Wedum and five other scientists from CDC published classification of [unintelligible] agents on the basis of hazard. These were classes 1 through 4. Today we’re in the 5th Edition, uh, under, um, development at this time of the biosafety and microbiological and bio-medical laboratories. Emmett Barkley and Jonathan, uh, John Richardson were the first to editors for that journal. Um, and you can see the, uh, historical exhibit for examples of those, of those, um, documents.

In 1956, Everett Hanell and Briggs Phillips were asked to assist, uh, public health service in decontaminating a DC4 airplane and the tarmac at the Washington National Airport. Live Polio virus was spilled and Everett’s term was sloshed out of open containers in the cargo area, which leaked onto the tarmac. [unsure of word] Ammonia Solution was used as the decontaminating solution of choice. Uh, in 1968, after more than a decade of, um, experiencing leakage of packages containing [unintelligible] agents, the head of the Department of Transportation stopped all shipments of etiological agents to the United States. This directly affected Ft. Dietrich [unintelligible]. Dr. Wedum, to try to combat this, he called his safety staff together and he announced to us, “We must develop a safe package for shipment of etiological agents so that we can change the law.” Without going into a lot of detail, Charlie Glick, uh, started dropping packages off the top of the safety building at Dietrich onto a concrete pad. I was assigned immediately this, uh, uh, at the same time to go to Dugway and drop packages from 1,000 feet from, uh, an airplane. You could say, “Well, how did you fella’s pull all this off?” Well, with the right connections, Robert [Alge?], who was the Director of, uh, Safety at Dugway was a former member of Dr. Wedum’s staff and my first Government employee supervisor. This greased all of the, the, necessary, uh, doorways to be opened for us, uh, immediately, and it wasn’t a matter of, “Can we delay this?” It was done when you, uh, asked a question, it was, you were supported. And, I was allowed to pick any material that was on Dugway, to prepare a package and drop it from this. After we had this, the results from these packages and we came up with the triple pack between what Charlie did at, uh, Ft. Dietrich and what I was doing at Dugway in three weeks we called the head of the DOT and announced to him that we were successful. Well, he thanked us for the good work and the prompt, uh, response and then he further stated to Dr. Wedum, “The greatest risks is when packages leak on during take, take off and landing of airplanes.” He says, “When you get data from that, please call me.” Very promptly and through Ev Hanell’s contact with the Air force, we were provided three C119 aircraft. This today would be a real; I don’t know how you would ever pull it off today. We worked with the U.S. Aviation Safety Test Group located at Deer Valley Airport, which is thirty miles West of Phoenix, Arizona.

After the initial planning studies with Dr. Wedum, Ev Hanell and myself, and the safety group, we crashed three C119 aircrafts, uh, into a concrete wall and, uh, by doing, to do this we had full throttle on the airplanes with Air force pilots and they managed to come up with a quarter mile of railroad track by modifying the, uh, nose landing gear, we were able to pull this off at 150 miles per hour. We placed in the cargo area of the plane several Triple Packages and a large torpedo-shaped agent transport container that was used at Ft. Dietrich and the sister organizations of DOD. Now to protect the, uh, torpedo-shaped agent transport container, we had tight-fitting balsam wood cocoon surrounding it. This was, um, a real engineering feat as far as I’m concerned because it, uh, captured all of the production out of Venezuela, the entire year’s balsam wood harvesting. So, Dietrich managed to get their hands on all of that. To pull these tests off we, uh, examined, uh, all of the packages and we ran sieve, Sieve and Slits Air and pension samplers located around the crash test site. Escherichia coli was the test bacteria used. We’d like to thank Dr. Marty Fovero for his support in offering us a laboratory in Phoenix, which was a sitl, satellite lab from CDC.

Well, to sum this up, all the data from the three crash studies we had no leakage on, from any primary container which included glass containers or the cocoon itself. We had some exterior damage to packages, but no liquid leakage. So, when we called the Department of Transportation Head with the gravity force measurements, the G-Forces, DOT, PHS and other organizations adopted the policy of Triple Packs. And they also among that group was the International Airline Pilots Association (IAPA). In the interim, uh, next twenty years, IAPA has come out with a set of test requirements of dropping packages without crashing airplanes. That’s what they’re using today to verify packages.

Another big item that Dietrich supported PHS on was that in support of Owen Mills, who were experiencing coetaneous and pulmonary anthrax with several deaths. After thorough analysis, there was major modification, some immunization of people who volunteered for it, as well as decontamination of these facilities with, uh using gaseous means. Jim Grantham, an ABSA Charter Member, performed one of the last decontaminations of the Owen Mill by deparaflamizing paraformaldehyde.

In the ‘50’s and ‘60’s, there were numerous, uh, developments on ultra-violet radiation, among those was the through the wall, single sheet ultra-violet radiation transfer device to get materials from containment out to the administrative area. This was pre-electronic days.

Uh, the other big item that emerged in the, uh, late ‘40’s and early ‘50’s under Dr. Wedum was to evaluate micro-biological techniques. In summary from those na, numerous studies, blowing the last drop from a pipette was eliminated by development of two-deliver pipettes with industry. Leakage from centrifuge heads was eliminated by installing o-ring seals on the centrifuge heads themselves. We had wearing blender modifications for mixing, uh cultures. Swinging buckets on centrifuge presented major problems. [Trenion??] cups were developed for that. Magnetic mixing rods were used for cultures and test tubes. Another big area that we, still today, are trying to get our arms around and get industry to adopt, is that centrifuges and life lising, [life utilization??] chambers and the discharge from the vacuum pumps, uh, release clouds of aerosols, infectious aerosols, during the use of these pieces of equipment. In line filters were placed between chambers, the chambers of these units and the vacuum pumps. This eliminated the problem.

The, uh, developments of plastic items were numerous in the safety group and Briggs Phillips was the lead on that, and this was then turned over to industry. Vaccines were developed by scientists at Ft. Dietrich, Dr. Tullis I’m sure will provide information on these.

In the late ‘50’s, about twenty glass Petri dishes containing colonies of Tuloremia were dropped onto a hallway concrete floor. The cause was the, the defective interlock on a through the wall autoclave which was attached to a Class 3 cabinet which was used in support of aero-biology studies. From these studies, numerous, uh, re-enactments, I was able to determine that aerosols were carried 70 feet in the hallway exhaust airstream. One scientist stepped into the hallway to see what the commotion was and he had inhaled and received a challenge, an over-challenging dose and came down with Tuloremia. Another, uh, thing that surprised all of us on the re-enactment was the use of quaternary ammonia com, compound, the disinfectant of choice, was sprayed onto the accident site by two individuals from a pressurized garden-type sprayer. These two individuals also came down with Tuloremia. So we a, what the, this produced for us, we eliminated the sprayers in all laboratories at Dietrich and a procedure of placing a towel on the accident site and flooding the debris and adjacent area with the disinfectant came into being. Individuals, uh, previously immunized with the Kill Tuloremia vaccine, would demonstrate [unintelligible] were overcome by a large bacterial challenge. Dr. Tullis will provide details on Tuloremia vaccines.

We all, I also found out in this study, in a Class 3 cabinet, that glass Petri dishes produce a higher concentration of bacteria as an aerosol, uh, than when compared to plastic Petri dishes. When this was found out, Dr. Wedum instituted a policy only plastic Petri dishes and all laboratory ware, all glass laboratory ware would be replaced with plastic. Ft. Dietrich then captured the entire year’s production from Falcon Plastic Company and was, is, used throughout all Dietrich laboratories.

During the Korean War, Dietrich received extensive funding to develop major containment facilities. Out of that came the design criteria for micro-biological facilities at Ft. Dietrich. Many people enjoyed the fruits of that labor in those years. Marshall Dick from Engineering and Ev Hanell were the key authors on this and they collected information from all people involved, uh, on this. From that came the major use of Class 3 cabinets in these facilities. Along with all the other components that we now all enjoy or at least share in, uh, the containment laboratories group building. The, uh, [clears throat] other thing that occurred in 19, uh, the mid ‘60’s, I found out that I wasn’t happy with the inflow capture velocity in Class 1 cabinets, so I talked with Dr. Wedum about it he said, “Well, go research it.” That was my order for a, for another project was very subtle, but you had to get things done. After thorough laboratory analysis, I established that an airflow of 75 feet per minute, plus or minus five, was necessary. I won’t go into detail because I’m sure you, it was all covered by Keith Landy who you heard earlier in the week. But, that was, uh, a major, uh, change and I had the audacity to charge, or challenge Dr. Wedum because they had established, uh, 50 linear feet per minute and most often was 45. As we all know, this was used in Class 1 and Class 2 cabinets throughout the world today.

During the ‘60’s, Dr. Wedum received the Secretary of Army Award, the highest award given by DOD to civilian employees for the improvements and refinements of biological safety cabinets. We were all really proud of Dietrich, uh, getting this cleared and, uh, he being recognized.

In the, uh, late 1960’s, uh, I, uh, also ventured into a project with the development of a gas or oil fire, large volume air incinerator. It was used to sterilize the exhaust air from a large aero-biology facility instead of using HEPA filters. In the mid and late ‘60’s, Ft. Dietrich, unknown to most people in the world, we supported the development, uh, construction and certification and use of the Luna receiving laboratory in Houston, Texas. Uh, the air incinerators I just mentioned were used in that laboratory to sterilize exhausted air. Under the direction of Ev Hanell, a training program was developed for the Navy for the recovery of the Astronauts from their flight. In the late ‘60’s, Dr. Wedum also asked me to take over a project to micro-biologically challenge an industrial refuse incinerator used on the post for disposal all, of all laboratory waste and animal carcasses. A very challenging study since there was never been done in the world and the problem was, how do you challenge an incinerator and how do you recover organisms from a hot air stream. This was solved with the help of the maintenance people at Dietrich. They developed a, uh, large volume air, uh, air sampler for me and we were able to cool that down without destroying the organisms. So, that turned out to be another success in our, uh, hands and the other thing it did was it established requirements for incinerators for the discharge of air exhausted, uh, from, uh, contain, contaminated air streams.

In the 1960’s and ‘70’s, early ‘70’s, Richard Kruse and Dr. Wedum published on animal cross-contamination from 18 pathogens and those recovered for micro, or, recovery, sorry, and a recovery of micro-organisms from feces and urine. Kruse also published research results on decontamination of cultures at tissue phases of Coccidioides mycosis. These classical research studies had never been done before. In the 1960’s, uh, gaseous decontaminations were perfected for enclosed spaces. I helped in the development in the use [betapropylactone??] and depolarization of paraformaldehyde. Many other contributions were made by Ft. Dietrich, but too numerous to review at this time. Most contributions that were developed at Dietrich were presented for the first time at previous biological safety conferences.

After the close of Ft. Dietrich, uh, the biological warfare program in, uh, 1972, I joined Emmett Barkley at the National Cancer Institute. During that time, a biological challenge emerged as to the risk associated with recombinant DNA technology. Dr. Barkley organized all key biosafety professionals to compile safety and equipment requirements for working with unknown risk levels of genetically engineered organisms. Another challenge that we faced in the NCI was that we were challenged by the scientific community in the U.S. that we need to develop and assess safety assess the genetically engineered organism of known, unknown risk. I was, uh, asked if I could, uh, take on and produce a, uh, Level 4 laboratory for this work. To achieve this, I renovated a mobile, self-contained laboratory trailer that NC had, that NCI had, uh, developed for oncogenic work and this was used to do the initial safety studies on genetically engineered oncogenic organisms. It’s historical now that we don’t have a difference between the paired organisms and the, um, engineered one that people were worried about.

After my stint at, uh, NCI with Emmett Barkley, I joined Agriculture Research Service, the United States Department of Agriculture, as the first biological safety officer national programs staff. During that period, among other things, I developed biosafety Level 3 and 4 agricultural requirements for research with animal disease for domestic livestock. Many of the diseases are zone autic, as you all know.

For more information on the biosafety contributions, please review the early issues of The Journal of the American Biological Safety A, Association and the 5th Anthology Series by Dr. Jonathan Richmond. Also review the additional references provided in each of these journal articles.

It has been an exciting, enjoyable and rewarding career to function as a biological safety professional. I wish each of you enjoyment in your career as a Biosafety Officer and professional. And, I wish to thank you and wish each of you God Speed in your journeys hereafter. Thank you.