# 21

Statement, with Hieroglyphic and Balloon Train Drawings

Charles B. Moore

June 8, 1994

STATEMENT OF WITNESS

Date: 8 Jun 94 Place: NM

CBM

I, Charles B Moore, hereby state that Jeffrey Butler, was identified as a Colonel, USAF and Jim McAndrew, was identified as a Lieutenant, USAF on this date at my home and do hereby, voluntarily and of my own free will, make the following statement. This is done without having been subjected to any coercion, unlawful influence or unlawful inducement. C B M.

CBM

I was the Project Engineer for the NYU balloon project during the 1947 time frame. I was not aware that the project had the name MOGUL until 1992 when I was contacted by an individual who was working on some research related to the "Roswell Incident" and the relationship to the NYU balloon project. Our only purpose for the NYU group was to develop constant level balloons. In the early flights at Alomorgodo, starting in June, 1947, we used radar targets to track the balloons (not all the balloons had targets). Some of the targets were apparently manufactured by a toy or novelty company. Ed Istvan was the procurement officer and he had contacted some company that extruded toothpaste tubes as well as radar chaff. The early balloons were made of neoprene and manufactured primarily by the Dewey Almy company in Cambridge and the Kaysam company. Dewey balloons were dip type and the Kaysam ones were cast in a mold. The neoprene balloons were susceptible to degradation in sunlight turning from a translucent milky white to a dark brown . Some of the material would almost look like dark gray or black flakes or ashes after exposure to the sun for only a few days. The balloon material and radar target material would be scattered after returning to the earth depending on the surface winds. The balloon material also had a peculiar acrid odor due to plasticizers and anti-oxidants. There is a recollection from another procurement person (Peterson) that he had obtained radar reflectors from a toy manufacturer. I have a specific recollection of reinforcing tape applied to the seams of the reflectors that had some symbols such as arcs, flowers, circles and diamonds. These were pinkish in color. To my knowledge, there were no radar reflectors in New Mexico in 1947 like the ones we used until the NYU group arrived. The Columbia group was primarily involved in developing low frequency microphones for long range detection of explosions. There was intense pressure for these developments, the constant altitude balloons and the microphone gear. I was involved in 1945 in China-Burma-India for the installation and maintaining of weather equipment in the war against Japan. Our subsequent work with the balloons and microphones was highly classified and we didn't know that there was a project name until 1992. Concerning the make up of the balloon trains, we used braided or twisted nylon lines--there were no monofilament lines during the 1947 time frame. Some of the balloons in early June carried radar targets for tracking purposes since we did not have radiosonde receivers with us.Some also carried sonobouys for detecting the pressure waves where we didn't have the Watson Lab microphone gear. All the radiosondes were coverend in white painted cardboard; I don't recall the color of the sonobouys but I believe they were covered in metal. On review of the photos in the Randle/Schmitt book, the material looks like one of our balloon and target assemblies. The wooden beams were made of a balsa wood that had been coated in an Elmers-like glue. The targets had eyelets where the various strings were attached. The 307(B) model was more of an aluminum foil material than the 307(C) model, which was more of an aluminized paper. The targets we used appeared more fragile than the later

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CBM

model. I think that Flight #4 was the flight that was launched out of Alamogordo on June 4, 1947. This is based on Dr. Crary's actual diary of the launch and other events. This is also one of those events where we went to multiple radar targets because we were not having good success with single targets. This flight was with multiple balloons and targets and may have had a sonobouy (black box?). The Watson Lab gear was the microphone equipment specifically for MOGUL. The idea was proposed in a 1945 letter from Dr Ewing (Woods Hole and Columbia) to Gen Spaatz that we might be able to detect nuclear blasts via pressure waves and low frequency microphones. This was developed from a study of the 1883 Krakatoa explosion where the pressure waves circled the earth seven times. Dr Crary was sent to Ascension island (the antipodol) to attempt to detect the Crossroads shot for Operation Crossroads on Kilohuea or Bikini. He didn't get anything. In December, 1946, Dr Crary was sent to Alomogordo to run the field stations for MOGUL. There were several ground microphone sites for detecting blasts (bombs) detonated off the New Jersey coast. He also initiated activities off Bermuda and Panama. Dr Crary and Dr Peoples were the advance people and scientific monitors for our project. Dr Peoples told us to use the cover story of meteorology and to enforce the need-to-know--in fact I had been reluctant to discuss any of this until only a few years ago. Your letter (SAF/AA) is the first official document I've seen that says this is declassified. Concerning the Japanese balloons, we did not use any of them for MOGUL. We didn't pattern our work after the Japanese balloons. We were very secretive of our work, but the cover story was not a detailed developed cover story. Our new hires were not even aware of the purpose. They thought they were just handling meteorological equipment. Any of the flights that had "tags" would have stated, "Research Balloon Flight, Request Return to NYU". The "service flights" for Dr Peoples were specific ones carrying the microphone gear. The radar test flights were not recorded. There was a lot of pressure to develop the constant level balloons. The tracking was to be done by the Watson Labs radar for the V-2 launches, etc. Starting in early June, 1947 the 307(B) targets came from NYU. We also launched TNT on some of the balloons to simulate airbursts for detection. All of these balloons were accounted for. These and the radar test flights had no tags--we did not want these to be associated with our project and the explosive ones would all be destroyed with pressure switches. To my knowledge, the NYU group were the only ones using balloons in New Mexico during this time but others were involved in other activities so debris from rockets, aircraft dropsondes, etc. may have been found throughout this area. Initially we did not coordinate any of our balloon launches with the Civil Aeronautics Administration. We had no contact with any of the Roswell personnel-- although Crary or Peoples may have. There were two July 8th press releases: in the earlier release, Col J D Ryan stated that radar reflectors were being used to track balloons for wind information. July 8th is the same day the NYU group returned to NYU, so we had no contact with the Roswell personnel when the announcement was made concerning having found the "discs". When we heard the news back in New York, we joked that they probably found one of our balloons. From that time up until about 1980, no one, officially or otherwise made any contact with me concerning the possible association between MOGUL and the "Roswell incident"( it was in about 1980 that William Moore contacted me and asked questions about balloons making "gouges" in the earth). The July 10th Alomorgodo News article shows a demonstration of some of our multiple balloons and target trains. We had no one there so it was surprising to see this. It almost appears that there was some type of "umbrella cover story" to protect our work with MOGUL.

C.B.M

C B.M.

I can think of no other explanation for Roswell than one of our early June service flight balloons. If one of our balloons went down there was no shroud of secrecy about it. We would attempt to recover the flight gear when possible, but the reflectors, balloons, and microphone equipment was expendable. We went to no great effort to recover the equipment and we certainly would not cordon off an area where one of our balloons went down. We would sometimes send out 3-4 men to recover the equipment if we knew where it went down. The July 10th Alomorgordo News report was a good cover--it does not appear to be a coincidence--I don't know who may have initiated it. Trakowski does not recall being involved in a cover story in one of my conversations with him. In New Mexico during 1947, all of our balloon operations were launched from Alamogordo AAF. CBM.

CBM I am not part of any conspiracy to withhold information from either the US government or American public. There is no classified information that I am withholding related to this inquiry and I have never been threatened by US Government persons concerning refraining from talking about this situation. CBM

SIGNED:

Charles B. Moore

_____

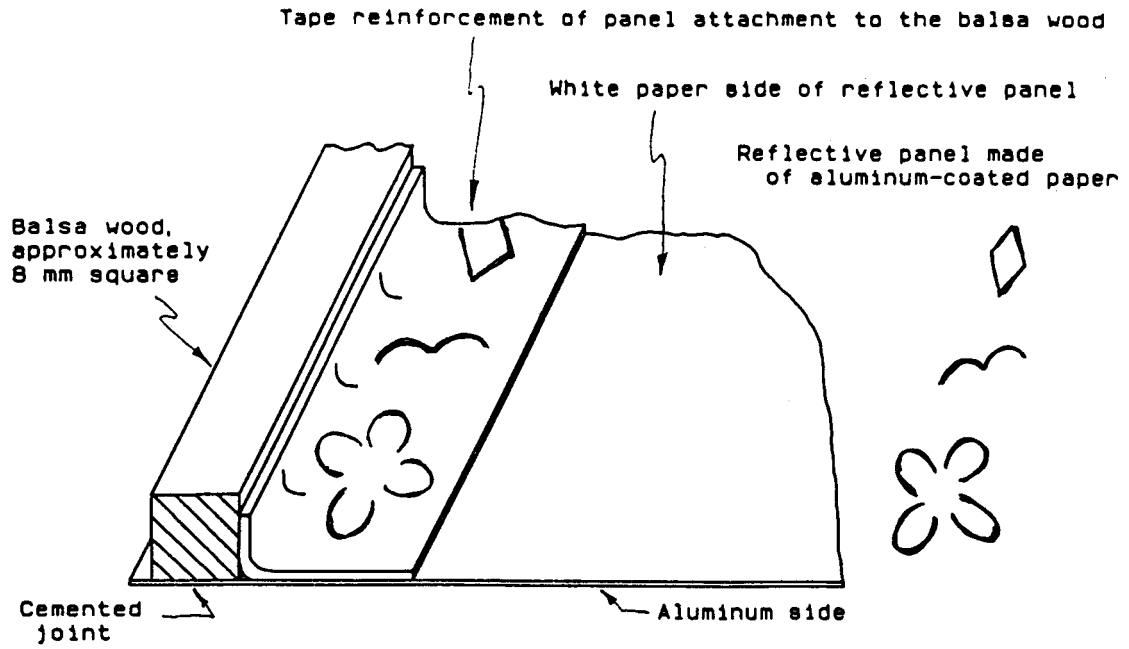
WITNESS(s):

_____

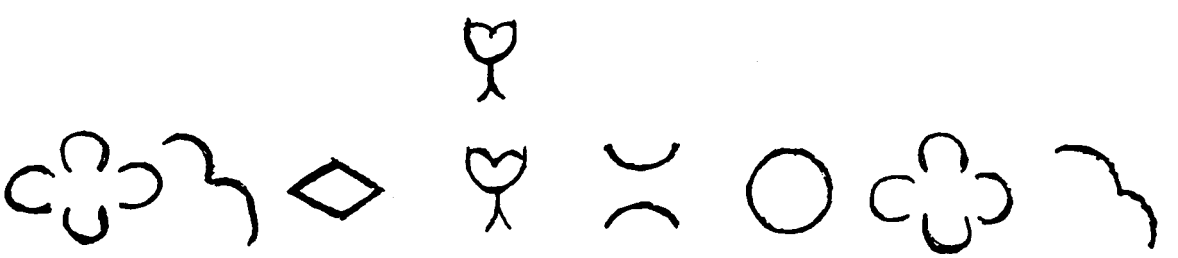
Subscribed and sworn to before me, a person authorized to administer oaths this
8th day of June 1994 , NM

JEFFREY C BUTLER, COL, USAF

JAMES MCANDREW, 1LT, USAF



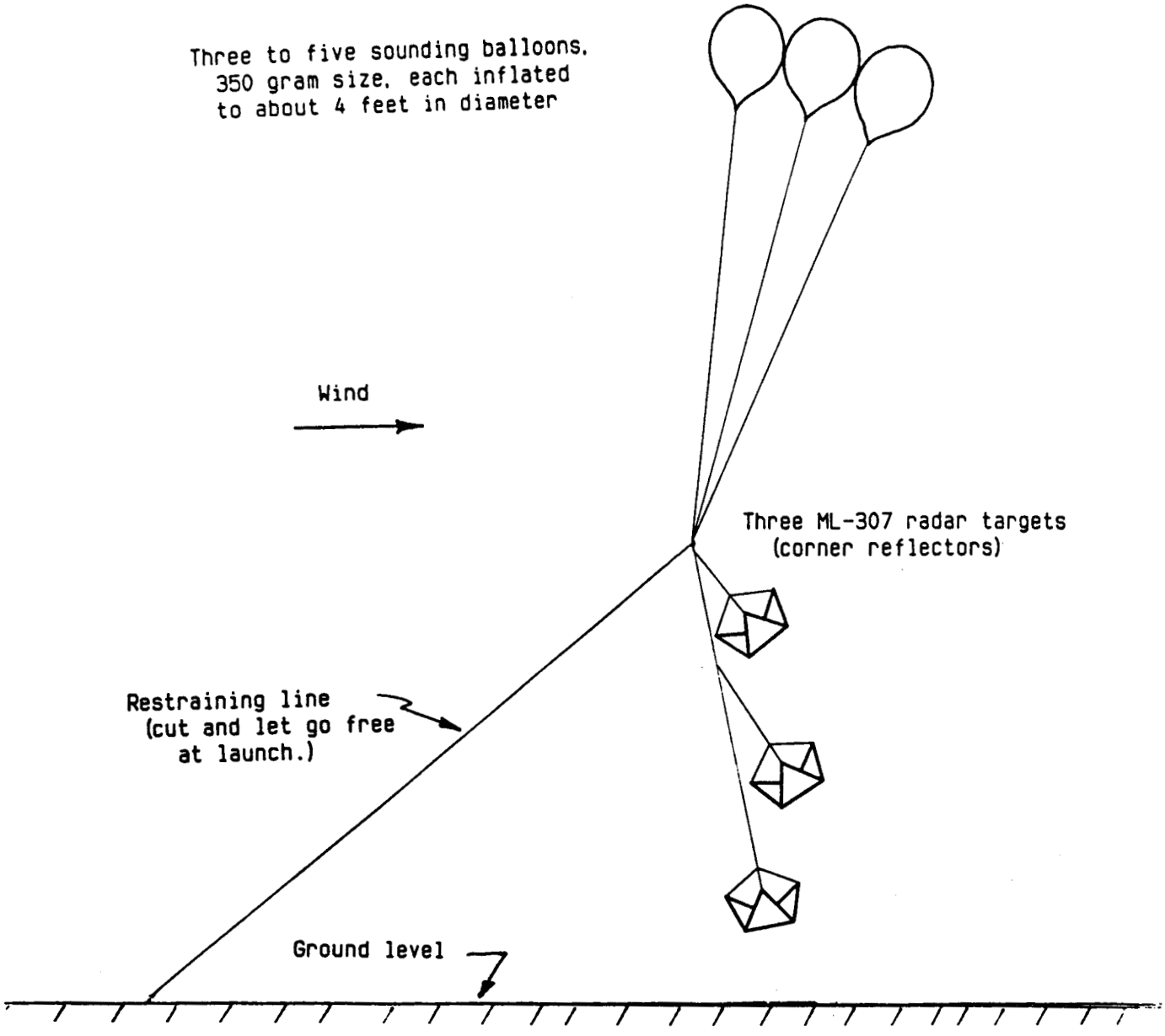

MY RECOLLECTION OF THE REFLECTOR MATERIAL ATTACHMENT TO THE BALSA WOOD PIECES ON THE ML-307/AP PILOT BALLOON RADAR TARGETS IN 1947.



AN APPROXIMATE REPRODUCTION OF THE FIGURES PRINTED ON THE TARGET-REINFORCING TAPE
(This is not authoritative since I last saw one of these targets more than 20 years ago.)

C. B. Moore

C.B. Moore
August 28, 1992




TYPICAL RADAR TARGET FLIGHT TRAIN USED BY THE NYU BALLOON GROUP IN 1947

# 22

Statement
Albert C. Trakowski
June 29, 1994

STATEMENT OF WITNESS

Date: 29 Jun 94 Place: VA

I, Albert C. Trakowski, hereby state that Jeffrey Butler, was identified as a Colonel, USAF and Jim McAndrew, was identified as a Lieutenant, USAF on this date at my home and do hereby, voluntarily and of my own free will, make the following statement. This is done without having been subjected to any coercion, unlawful influence or unlawful inducement.

I was provided a background on the Air Force efforts related to the GAO audit and it's association with the "Roswell Incident" and project Mogul. I personally know all the persons that Col Butler identified to me as having been contacted in this effort (Spilhaus, Moore, Istvan, Fletcher, Ms Duffy). I have also been contacted by several researchers and writers and discussed project Mogul and provided some documents to some of them. Robert Todd, I'm not sure whether he was a believer or not. Charles Ziegler was working on the history of nuclear weapons detection capability. He had some letters/papers that I did not have such as the letters the Gen Spaatz directed the establishment of project Mogul. Carl Pflock apparently wanted to establish the "incident" of Roswell as a UFO incident. Charlie Moore was primarily responsible for development of the constant level balloons for lifting the instrument packages. Concerning a cover story for the project Mogul, there was no planned cover story. I do not recall any documentation nor any efforts to develop a cover story even though the security for Mogul was of great concern. Charlie Moore and Athel Spilhaus used meteorological research as a cover but this was a spur of the moment effort--it was an obvious answer to a query--there was no documentation for using meteorology. We never considered a planned cover story; we were concerned with security.

I was the project officer succeeding Col Duffy in approximately November 1946. My primary purpose was nuclear weapons and guided missiles detection programs. Previously, I was appointed as the laboratory chief in the Signal Corps as an Air Force officer in charge of the Spherics program and later for the development of weather radar. Since my background was in physics, I took over project Mogul. It was the only Top Secret project at Watson Labs and I was the Top Secret Control Officer, so I knew the impacts with security associated with the project. We moved from Watson Labs to Cambridge Me which combined became the Air Force Cambridge Research Center, and I became the Director of the Air Force Geophysics Lab (and remained so until 1949). Through 1949, I was the director of both MX968 and Mogul. As the Mogul director, I went to Alamorgordo Army Air Field in early July 1947, to observe the New York University balloon group. The "Roswell Incident" occurred after we had returned to Red Bank (Watson lab) NJ. I became aware of this only after Col Duffy called me from Wright Field from his home. This was just an informational call, he just wanted to let me know that someone had come to him with some debris from New Mexico and he said, "this sure looked like some of the stuff that you launched from Alamorgordo." Duffy was very familiar with the various

apparatus and materials for the project, so if he said that it was debris from the project, I'm sure that's what it was. He was not concerned with a breach of security for the project.

Concerning the name Maj Pritchard, he may have worked for me but I don't recall him. I have no knowledge of any counterintelligence. or intelligence persons on the project or associated with my directorate at Watson or Cambridge Labs. When we took over the project, we were aware of the sensitivity of the project--we were aware that we were working in the open--it was a weakness of security because the activity could be observed. I never observed any of the balloon "trains" but I did see some of the early reflectors. Some of the reflectors were procured from sources out of normal channels. Some of the contractors lined up were not quite in concert with typical Signal Corps practices and procedures. Jack Peterson was very energetic and could make procurement actions take place. Ed Itsvan, who I believe actually arranged for production for some of the reflectors, actually went to a toy manufacturer in New York city to get some. It was kind of a standing joke. I remember that some of the prototype and preproduction targets had this pink or purplish tape holding the material to the balsa beam. This tape had flowers and other designs on it. The reflectors were probably made starting in late 1944 but I do not recall how long the production run was. I do not recall any other specific attributes but they were geometrically and structurally simple.

I am not part of any conspiracy to withhold information from either the US government or American public. There is no classified information that I am withholding related to this inquiry and I have never been threatened by US Government persons concerning refraining from talking about this situation .

SIGNED:

Albert C. Trakowski

WITNESS(s):

Subscribed and sworn to before me, a person authorized to administer oaths this
28th day of June 1994 at , VA

JEFFREY C BUTLER, COL, USAF

JAMES MCANDREW, 1LT, USAF

# 23

Interview
Col Jeffrey Butler and 1st Lt James McAndrew with Professor Charles B. Moore
June 8, 1994

Transcript from 8 June 94, Interview with
Professor Charles Moore

(A) Professor Charles Moore
Project Engineer - Project Mogul
(Q) Colonel Jeff Butler
(Q) Lieutenant Jim McAndrew
8 June 1994

A: ...Dr. Spilhaus, who you may have met, was really the Director of the project.

Q: We talked with him last week. He sends you his regards. He's a very interesting man to chat with.

A: But I was essentially the project engineer and a graduate student, whereas he was Director of Research at New York University at that time.

Q: We have gone through many of the various technical documents related to Project Mogul and some of the other work that you and Dr. Spilhaus and others have done with the Constant Altitude balloon projects. According to Dr. Spilhaus, he said you would be the technical expert as it related to those types of projects in terms of the materials involved, the instrumentation, that sort of thing. Is that a pretty accurate statement?

A: I think that's correct.

Q: What we're really here for is to discuss this that came out in the newspaper and the General Accounting Office's investigation of how we deal with records, the acquisition, and ultimately disposition. There is an allegation that the Government is involved in a conspiracy and coverup of something that occurred in 1947, which is the allegation of their being some sort of flying disk, flying saucer, UFO, what have you.

A: That's correct.

Q: Of course the people who put out things such as this journal, MUFON, Mutual UFO Network, the books that have been written by William Moore, and Randall Schmidt, and others, a lot of the popular television shows, they've just exacerbated the situation where a lot of things, quotations, some of your quotations taken out of context. One of the individuals, Sheridan Cavitt, who at that time was a Counter-Intelligence Corps officer at [Roswell] Army Airfield who actually went out with Jesse Marcel to recover some material that has been alleged to be the results of a UFO which Colonel Cavitt specifically states looked like a weather balloon to him.

A: I'm aware that he had been there, but I'd understood that other quotations had been attributed to him.

Q: Yes, sir. As we go through this, I believe I've got a copy of essentially a statement he made to Colonel Weaver, whom

you've talked with also. Colonel Weaver talked with Sheridan Cavitt two weeks ago. So a lot of the statements that have been attributed to Sheridan Cavitt, he says they're taken out of context. He refutes a lot of the information that appears in these various books.

What I'd like to do, even though this is out of a popular UFO type of magazine, is there are some statements attributed to individuals concerning the material that was found, supposedly by Mac Brazel, somewhere northwest of Roswell, New Mexico. They talk in terms of materials that look like metallic foil, and specifically that "could not be bent or broken."

As we've gone through the various research, what we believe to be Project Mogul was probably involved in this incident. The materials that were being used in Mogul included, of course, not only the polyethylene balloons, but included the neoprene balloons at some point, the various types of radar reflectors, the instrumentation that was being used. Is there any type of material from that project that you can think of that would be pliable, would be bendable, but could not be torn? Could any of the polyethylene or the foil-like radar reflectors, could that be the case?

A: Let me get a picture for you. This is a radar reflector manufactured in 1953. It's the ML-307C.

Q: Which is a little different from the B model that was used in 1947?

A: Where this looks like a pine stick, the material on the ones we had, this was all balsa and somewhat smaller in diameter, but the configuration, with one exception... This configuration of corners, these corners were the same thing. Here's a picture of this sort of target being used in 1948, and you can see we are launching multiple targets beneath this balloon.

Q: Is this the same type of target as this, or is this the B model?

A: This is the B model we flew in 1947 and 1948. Those are pictures of the B model. If you look, faintly along here you can see a sort of a discoloration, and that's where my memory of the reinforcing tape was that they talked about. The B models, as I remember, did not have these three vanes up here. You don't see particularly any suggestion in other photographs I have, I don't remember these which would make the thing rotate in flight.

But this, in the B models was more like an aluminum foil with a heavy laminated paper. So the material they talk about, I think, was derived from some version of this.

Q: They talk in terms of the material, being able to crumple it and releasing it, and it would unfold by itself and

not leave any creases. This material looks like it would almost be like aluminum foil, would crease and remain creased.

A: It does have this paper laminate, and the paper, I think, was maybe a bit tougher on the earlier thing. But I have no explanation for the fact that it couldn't be bent with a sledge hammer, as one of the people said, and couldn't be...

Q: Burned?

A: I think some of the balsa wood was dipped in something like Elmer's glue, and as a result had some sort of a glue coating on it which would make it somewhat resistant to burning.

Q: I know in Colonel Weaver's discussions with Sheridan Cavitt, they talked about the aspect of burning. He did not recall burning anything, but then his wife indicated that there had been one night they'd been out and had a barbecue and had a few beers and that Jesse Marcel just took a piece and stuck it in the barbecue and then pulled it back out. So if that's what they're using to say it wouldn't burn, that's what we consider typically testing a material for burning or not.

A: I need to say here, you need to qualify everything I say with the memory of almost 50 years ago. I will say things that are to the best of my memory, but on the other hand, should other evidence indicate my memory is faulty, I readily accept that. So I'll state things to the best of my memory, but...

I have a memory that there was something like Elmer's glue... There was a problem in attaching this to the paper behind.

Q: Going back to the reinforcing tape and things, there were discussions concerning unusual symbols and almost like hieroglyphics -- purple, pinkish in nature, that sort of thing.

A: I don't know if I sent Colonel Weaver a copy of the sketch.

Q: No, we did not see that.

A: Robert Todd, who has been a person very interested in trying to get to the truth of this, asked me to make a sketch of what I remember. A couple of years ago, or a year or so ago, I made this sketch, and this is my memory of what was there.

I do remember every time I prepared one of these targets for flight, I always wondered why these figures were on the tape. There was always a question of why they were there. When this purplish-pink marking on the debris came up, I immediately remembered this sort of marking. Other people, I have a letter here from one of my technicians, who says oddly he remembers the same marking. You, perhaps, have talked to Albert Trakowski...

Q: We have tried to reach Colonel Trakowski, and he has not returned our calls. We've left messages on his answering machine, and there's been no response.

A: He may be out of town. I did visit him last October, and he made the point that... He was our project officer. He and I served together under Colonel Duffy in the Air Force Liaison Office in 1943 to... Well, I went overseas in '44 but Trakowski stayed and took a commission in the Air Force when it was offered and was the project officer on Mogul. I have some paperwork here from General LeMay's files in which after the war a number of people were to be sent overseas because they had not had overseas duty. There is a history of Colonel Trakowski. Perhaps you have it from the Pentagon files already, from the AG files.

Q: We have some records, yes.

A: Anyway, Albert Trakowski was the Watson Laboratory project officer on this. When I raised this question to him he said he had talked to John Peterson, one of Colonel Duffy's procurement men, and they were joking about these markings on the tape. I have a letter that I can give you a copy of in which I quote Trakowski in saying, "What do you expect when you have your targets made by a toy factory in Manhattan?"

Q: So essentially, the original targets were made by a toy company?

A: Well, it's either a toy company or a garment manufacturer in the garment district in Manhattan, or it was by a novelty company. I talked to Ed Istvan who was another one of the Air Force liaison office people who stayed in. Istvan lives in your area. I can give you documentation on these things. Istvan says that it was some outfit that extruded toothpaste tubes and he got involved with them because they made radar chaff. In the early days of this effort, there were a number of different targets made. I don't have them here, I have them downstairs, there were a number of different forms the targets were made. One idea was just the inside of a meteorological balloon, to put radar chaff and adhere it with glycerine. Just wet the inside of the balloon with glycerine and then shake in dipoles cut to the proper half wave length. When the balloons were inflated, these would be all on the inside, coating the inside of the balloon. This didn't give nearly the sort of target that the corner reflector gave.

But anyway, Istvan initially went to New York hunting for a source of supply and came across a company.

(Pause)

A: ...much of which we can copy and make it easier for you. These are balloon fragments, things that held balloons [up] after they'd been exposed to the sun.

Q: Is this the neoprene type or the...

A: That's the neoprene type. I have the polyethylene type...

Q: Is this from the '47 era?

A: That's a balloon probably from the '50s. That's a K-San balloon. The kind of balloons we used then were the (inaudible) derricks balloons, and that's the way they look after they've been out in the sun. That's about three weeks' exposure to sunlight here in New Mexico.

Q: So the polyethylene really is degraded by sunlight.

A: That's neoprene. All that's neoprene.

Q: This almost looks like ashes of paper.

A: That's right. And there's a big point in some of the recovery that the material was black...

Here is the list of the people who were assigned under Colonel Duffy in the Air Force liaison office. Istvan's name you'll find in there. He ended up being in the Titan program and, I think, retired as a lieutenant colonel maybe back in the '70s.

Schneider was the administrative director of our project. He and I worked together. He was in Maine, and was not really technically involved. I have letters from him if you're interested in seeing them. He says he has no memory of this.

A person who was heavily involved in developing this whole radar thing was Colonel Joe Fletcher. I wrote him a letter asking for his help and he essentially says he doesn't remember much.

Q: He's also been hounded by some of these UFO...

A: And by Todd and by me.

Q: So it appears as though you, yourself, have done some extensive research into this particular incident.

A: Until two years ago, I was quite convinced one of our polyethylene balloons we didn't recover caused it. Then I got this newspaper, Todd sent me this, and I immediately saw there's no way that could be a polyethylene balloon.

Q: W.W. Brazel mentions eyelets which appear in the reflectors. There's also, on the polyethylene balloons, the shroud however you had it hooked on there. There's eyelets around the base. There was a ring at the neck of the balloon and then there were attach points to that ring, were there not?

A: But there were no eyelets.

Q: I believe there were. I've reviewed the New York University documents and there's a very clear depiction in one of them of eyelets.

A: Okay, I was thinking of the later... Here are the NYU reports, the originals of them.

Q: In one of the configurations they clearly show eyelets in the drawing.

Q: Going back to Brazel, you state that you think it could not be one of the polyethylene balloons. He indicates in this newspaper article that he actually found the debris in mid-June, however it didn't subsequently come out until July.

A: You're right. That is in one of the polyethylene balloons, you're correct. I fall back on my plea that my memory isn't...

Q: It comes into depending on what Brazel was speaking about.

A: There are clearly eyelets here. In fact there's a little swivel.

He talks about the smoky gray rubber...

Q: Which these samples here, as you say, if they'd only been out for a short time, a matter of days, smoky gray, that's a very good description of what they looked like.

A: And when you first retrieve it has a bad odor. And people talked about there being a burned odor.

We need to talk about these neoprene balloons because they came in different... There were two manufacturers -- one, Dewey & Olney in Cambridge manufactured with a dip process and they had very much the appearance, if you will, of a condom. They were an ivory colored jell. The Kaysam company in Patterson made a cast neoprene emulsion into a mold, and then they inflated the mold. They had to put a lot of plasticizers so they could take this wet jell and inflate it and make it into a meteorologic balloon. This is a Kaysam balloon here, which I think is not a good candidate.

Q: Kaysam?

A: A guy named Sam Kay formed a company and it was called Kaysam. In fact I have, and you're welcome to them...

(Pause)

A: Kaysam balloons because of the way they were made, and this jell that had to be inflated had this ring, cardboard ring put in them. That's the neck of a Kaysam balloon, and here are more modern Kaysam balloons, the sort that are still being flown.

Q: These are just used for the typical meteorological type balloons.

A: Carry radio (inaudible), that's correct.

Dewey & Olney have gone out of the business and Kaysam bought them out. Here's a Kaysam balloon that is made by a dip mold. This is somewhat indicative, I think, of the way one of those balloons of the type we're using. As you can see on exposure just to ordinary light, they discolor. But these are balloons that were made probably in the '70s. As they change with plasticizer and anti-oxidants for ozone, they certainly change in appearance. The balloons we...

I have pictures here, pictures in the hangar. There, as you can see, these are the ivory colored balloons of the sort we were flying. This is the balloon you just found the eyelets on in the hangar. These are pictures from the 1947 era where we're getting ready to fly the 15 foot H.A. Smith balloon.

Q: The reinforcing tape on these balloons, these polyethylene balloons, we were told is a type of acetate. It had none of this symbology, is that correct?

A: None at all.

Q: So the symbology on the tape was only related to the radar reflectors.

A: That's correct. Here is a later model polyethylene balloon, and it's a little thinner than the ones we were flying, but there's a polyethylene balloon.

Q: It looks like polyethylene sheeting that I would use to cover up...

Q: I've also heard the early balloons described as carrot bag quality. Material they would use in a carrot bag. Dry cleaner bags.

Q: Dry cleaner bags. We think of them as being very fragile, but materials from this time frame have been described as durable -- something you couldn't tear with your hands.

A: That's about two mil polyethylene here.

Q: Obviously, you could tear this.

A: This was four mil. These balloons that we had... That's Flight 8. These are the little balloons here that are seen from the air.

Q: From a B-17?

A: I think this was a C-45. We did, indeed, have B-17's attached to us, and C-54's. But I think this was trying to chase Flight 8 down. This was one of the candidate flights that I thought might have been, until two years ago, I thought might have been an explanation for what occurred.

Q: Why did you change your mind at that point?

A: Because of that newspaper report right there.

Q: Because of him saying that he actually found the material in mid-June?

A: No, because he said it was balsa sticks and smoky rubber and had those curious markings on that. That's a very vivid memory I have of these markings on the radar targets we flew.

Q: You said you often wondered why those markings were on there. Had you ever resolved that for yourself?

A: Only what Albert Trakowski told me, that our friend John Peterson, the procurement man, was just joking, "What else do you expect when you have your targets made by a toy factory?"

Let me go back, if I may. Colonel Duffy was assigned to extract meteorological equipment out of the Signal Corps in 1943. There was a great argument that went on between the Army Air Force and the Signal Corps. The Signal Corps didn't want to let any meteorological equipment out until he thought it was perfect. At the same time, General Arnold was expanding for a global war, and was trying to get meteorological equipment all around the earth. So Colonel Duffy got assigned to expedite the equipment. As various of us graduated from the meteorological cadet schools, he took those of us with engineering backgrounds and assigned us to bird dog various things within the Signal Corps engineering laboratories. I got assigned to... I ended up with some appendicitis and got pulled off of an overseas shipment, and while I was recovering I got assigned to prepare this manual that Colonel Duffy, he was unhappy with the rate at which Signal manuals were coming out so he wanted a loose leaf arrangement to send things out. So I got assigned to prepare this manual.

At the same time, then Captain Fletcher was assigned... Duffy had heard that weather was giving trouble to radar, so Colonel Duffy just turned around and said, "Gee, you mean radar can pick up weather?" And ended up with Captain Fletcher being assigned to both convert this for looking at storm clouds and also to make wind measurements. There was a big problem, the Weather Bureau prior to World War II determined upper winds merely by releasing a pilot balloon, following with the (inaudible), and estimating the rate of rise, and then from the elevation and azimuth angles and the assumed height after a certain time, to calculate what the winds were.

Q: Is that the Boford Scale?

A: Well, Boford was Navy, that was the Navy...

Q: Like taking a Pi Ball reading now.

A: Exactly. It was called a Pi Ball then and it is now. Colonel Duffy pushed very heavily to get electronic means for measuring winds aloft. There were two approaches. One, use a radar target, and the SCR-584 with which you may be familiar -- the early gun-laying radar. Colonel Duffy talked to the field artillery that was procuring through the Signal Corps, gun-laying radar, the SCR-584, which is, that's this radar right here.

Q: We've seen that photo before.

A: This is Spilhaus's book. So Fletcher ended up with a whole bunch of his own 2nd lieutenants around. There was a Jud Tibbett from whom I have a photograph showing an earlier model target, the A Model target. Istvan was one. There are a bunch of them listed. This listing is for you if you'd like to have it.

Tibbetts ended up being the big installer of radar and, in fact, was assigned down to the Tulerosa Range Camp to make wind measurements for the Trinity shot, the test in 1945. As far as I know, that was the first time these targets had been used in New Mexico. Tibbetts, who until recently lived in Albuquerque, he's now moved to Scottsdale, Arizona. Tibbetts says that he did not ever fly this kind of target in New Mexico, which will be of interest with you when they talk about, that people should have known what a target looked like.

Q: Right. There were discussions concerning having radar targets, but supposedly the B Model and subsequent models were brand new, had never flown anything like that in this area.

A: According to Tibbetts, the A Model had bit aerodynamic drag. It was a flat plane of aluminum foil and had two triangles coming down that made a corner reflector. The A Model looked like... Then across here was that. This is one surface, this is another surface, and this is yet another, and they were held by

strings from these four corners. Obviously, trying to take something that's almost a meter in cross section, a meter on a side, take it sideways up through, gave a lot of drag, and it took a lot of lift to make the balloons rise very rapidly.

So instead, somebody came up with this smart idea of this other arrangement of a corner reflector that had much less drag. These, according to Tibbetts, weren't distributed until something like November of 1945. As far as I know, as you will see in the various correspondence, there were no SCR-584s which were required to track them, issued to the weather services here in New Mexico. Obviously, after the Trinity shot, there was no bit military operation that required wind determination in New Mexico.

Q: So essentially you'd say there were no radar reflectors in New Mexico until 1947 until this appeared?

A: That's my opinion.

Q: Was Major Pritchard doing any kind of balloon project?

A: No. He and Dyvad and others were at Watson Laboratories. I understand from Trakowski that Alamagordo Army Air Field was about to be closed down as surplus. The people at Watson Laboratories seized on it and were able to keep it on active status for two projects -- one, the radar project from Watson Laboratories that was set to track the V-2 being flown from the proving ground across the Tulerosa Valley; and Project Mogul.

I joined the NYU group in January of '47, and while I was finishing up at Georgia Tech I had talked to my chemical engineering professors, I'd already been recruited by Duffy and Spilhaus, and I asked if you wanted to make a balloon of non-extensible material, what plastic would you use. My professor named Grubb told me you ought to consider polyethylene. It's a new plastic just now becoming available. You can heat seal it. It has a lot of desirable properties.

So as soon as I got to NYU, I began talking to everybody I could find in Manhattan -- DuPont, all the sales offices...

Q: We saw your listing.

A: I was concerned with where we could get the plastic and who we could get to manufacture the balloons. I was in my 20's, just a recent graduate. I knew nothing about manufacturing. But we did try to get a manufacturing company that would fabricate balloons for us.

During that period we heard of the Navy project that was going on at General Mills where Jean Get was planning to make a flight to 100,000 feet. General Mills at that time was making

balloons out of a Goodyear film called pliofilm. It was a vinyl chloride that just went to hell when exposed to sunlight. It really came apart. So I'm very proud that we began pushing them for polyethylene balloons. With some difficulty we got Otto Winzen who was the entrepreneur and promoter, working with Get, and we got him to make these balloons you see here in the design that was being planned for Project Helios, with the pliofilm balloons. At the same time we got an entrepreneur who was even faster acting, and that was this fellow A.J. Smith. A one-man shop. He would do anything for money. He, indeed, did. With no great technical background, he made a number of these balloons for us.

Q: Kind of a garage type of affair where he would sit down and make them one by one and...

A: I don't know. He got some girls and got some assembly workers, for a contract from us. Anyway, we got these balloons going, made visits to Minneapolis to push General Mills. The pressure from the Air Force was enormous. There was a similar problem, of course, in developing microphones that would pick up low frequency sound waves with Columbia. There was much enthusiasm, in testing these microphones.

Q: How did you come to join the Army Air Force?

A: When World War II broke out I applied for pilot training, and so did everybody else. Because I was a senior at Georgia Tech in a chemical engineering course with a fair amount of thermodynamics and other things, I got diverted into the meteorological cadet program. I still wanted to be a pilot but I got diverted into the meteorological cadet program, and the next class that I could join didn't start until December of '42. I joined up sometime in '42. So I went through the meteorological cadet program and found I was a lousy forecaster, but I did end up, when Spilhaus came recruiting for people with engineering background, I got recruited into Colonel Duffy's liaison office.

Q: Was that directly for General Arnold's staff?

A: I was assigned, believe it or not, to Headquarters, Air Force... I still have the Headquarters Air Force [rondelles]. I ended up being assigned to Headquarters, Army Air Force. I was a second lieutenant.

Q: So you got recruited by, at that time, Captain Spilhaus.

A: Right, and I got sent to the Weather Equipment Technician School in Spring Lake, New Jersey, essentially Fort Monmouth. When I finished the training course for radiosonde and for maintenance of equipment, I was headed for North Africa, and I had a medical problem. When I got out of the hospital, I was assigned back to Colonel Duffy. I remained there. I finished

this manual in '44. I was commissioned in September of '43, finally, and then finished the school in November, was assigned to write this manual which was finished in the summer of '44, and then I got an assignment to China.

Q: With Dr. Spilhaus?

A: No. I ended up being the weather equipment officer for CBI and the Spilhaus came over later. At that time the war was going very much better. Spilhaus and Duffy had a long range storm detection system, the spheric system, the predecessor of what's used now for lightning detection, the storm scopes, and the LLP. If you're familiar with LLP, the lightning location system...

Q: Used by the Weather Service.

A: We have one of the stations here on campus. And we actually have, if you're interested later on we'll go over and show you, we have a map of the lightning strokes over the entire U.S. as they occur. We have a read-out right here in our laboratory.

Q: So you're doing that work from China?

A: Spilhaus came over with the spherics net, it was called, and got a station installed in Chianting, China to work, of course, for the bombing of Japan. So Spilhaus came over I think the summer of '45 is when he came over. We had the radio wind, the ra-win, the SCR-658s, we had a number of them that were being installed. We had one up in Yunan in the communist area; we had several of them in China for getting good wind measurements. Spilhaus had been involved in that. I think by '45 it was clear that things would be over relatively soon. We thought we'd be back in '48. In any event, he got an assignment over to 10th Weather in the summer of '45 and came over.

Q: At what point did you ever hear the term long range detection?

A: That's a good question. I didn't know the name Mogul until Robert Todd told me two years ago. I'd never heard the name Mogul -- the classification was that high. I knew what we were doing. When "Helgoland" was exploded in April of '47, we had balloons in the air. We launched balloons out of the Watson Laboratory, actually Eatontown, what had been the Eatontown Signal Laboratory, but I think it was now Watson Laboratory. In any event, we launched a string of balloons, even though we didn't have [constant-level] balloons, we still carried microphones aloft and a C-54 orbited overhead and followed the balloons out to sea. I have no idea about the results that they got.

Q: Did you number that balloon flight?

A: No, we didn't.

Q: Not a letter or a number?

A: Wait a minute. The answer is, I don't know.

Q: If you did give it a letter or a number would it be on... There are some of these flights that appeared to have no sequence number and they were talking in terms of being service flights and the impression that we got was that the service flights were either test flights just to check the balloons out or they were the highly classified flights where the information was not being logged into essentially an unclassified document.

A: You notice that Flight 1 was made from Bethlehem, Pennsylvania.

Q: The football field there?

A: LeHigh, exactly. That's where we did it, from the football field. And we did this because a professor at NYU had just gone to head up the physics department at LeHigh and he invited us over. His name was Frank, Butler keeps coming to mind, but I'm not sure that's the right name. Anyway, we went there and that was for an early, early attempt for Helgoland. I think the Helgoland explosion got scrubbed, but we had balloons in the air from this and we were woefully not ready. We had all sorts of problems. We adopted the balloon technique that a cosmic ray investigator at NYU, a fellow named Sergei Korf, we adopted his technique and we had a lot to learn. We got our hands torn up with nylon line being pulled through it as we couldn't hold the balloons down in the wind...

Q: Speaking of nylon line, were these braided type lines or were they monofilament type lines?

A: Neither. I think initially we used either parachute cord, which was braided. I don't remember the details of what we used, but we rapidly used that the radiosonde cord we used was not strong enough at all to hold the forces that came, so we went to what was called lobster twine. We used a lot of lobster twine that was twisted, a laid line that was used in lobster nets.

Q: Do you recall there ever having been some sort of monofilament similar to the monofilament fishing line in any of the projects?

A: I think there was none available at that time. My memory, the answer is yes, we've used an awful lot of monofilament and we use it now all the time.

Q: But at that time you don't think it was available?

A: I think it was not available.

Q: The early nylon line, would it have degraded, such as the balloon material degraded, and maybe fused in the hot sun?

A: I doubt it. If we had any it would have been white, which would have been a high (inaudible), would not have absorbed a lot of sunlight.

Q: There were discussions about what appeared to be unbraided or unstranded fiber type lines. It's been alluded to that was the precursors to what we use for fiber optics today. The materials that were found. That's why I asked about the monofilament line.

A: A lot of what we used early was a linen cord, not twisted, and it was indeed, a brown, a dull brown color. But because it was designed just for radiosonde balloons, and we rapidly exceeded its strength. So very quickly, and I don't know when, but we very quickly went over to this twisted lobster twine.

To answer your question, there are three flights that are missing here -- two, three, and four. I've identified Flight 4. Flight 4 was a flight we made, and you don't have it there, but Flight 4 we made in Alamagordo something like June 2nd or 3rd of 1947. The reason I have it identified is I have Albert Crary's diary. The scientific end of the group was heavily based from Columbia University. It was Dr. James Peoples who was an employee of Watson Laboratory, and there was an Albert Crary who had been a graduate student under Dr. Ewing.

Q: Who later also was an employee of...

A: Who was then an employee of Watson Laboratory. I have Crary's diary. Here is a translation...

(END OF SIDE)

A: ...Here is the diary starting May 24, '47, and on May 28 he has "B-17 from Watson with Mirs, Hackman, NYU and Alden, they plan to test fly balloons tomorrow. Other gang with recording equipment due to leave Watson Laboratories Saturday. Got everything ready for Hermes Rocket today."

May 29th. "Mirs and Hackman got balloon ascension off at 1:00 p.m. today without plane to follow it. Don and Godby out to Donyo. Bill and I out to E. White Sands to record Hermes."

I've marked the key things here with red, and then I've given you a page without my red if you have any need for that.

June 1st, "C-47 with Moore, Schneider and others from NYU, also Irewin, Minton, Olson, NYU men worked on balloons, north hangar."

June 4th, "Out to Tulerosa Range and fired charges between 0-0 and 0-6" something. "No balloon flight again on account of clouds. Flew regular sonobuoy mike with cluster balloons and had good luck with receiver on ground but poor on plane." I think that's Flight 4 right there.

Q: So that's June 4th.

A: As to that flight made by Mirs and Hackman earlier, we have no record of it here in the NYU summary.

Q: If he flew that on June 4th and it carried the microphones, the radar reflectors, that would have been with a neoprene type balloon.

A: There were no plastic balloons delivered until the 28th or 29th of June that year. So everything as evidenced on the Helgeland flight that we made and the other flight, they were all meteorological balloons prior to late June.

Q: That would have also had the B Model reflector, this type of reflector, but the B Model?

A: My memory is that Jim Peoples, because we were being sent down by B-17 and by air, didn't let us take the radiosonde receiving equipment which at that time was very heavy. It was like a 500 pound rack with a receiver, frequency meter, recorder, etc., and we weren't allowed to use that. Instead, the idea was that Peoples would provide tracking on the balloons with radar targets and so on. So this is where I think the radar targets come in. If you look in these reports you'll find here statements, radiosonde reception, and you'll see 60 percent with recorder, 50 percent without recorder, 100 percent without recorder for June 5th. A hundred percent without recorder.

So I think we tried the radar targets, as I remember, our contact who was a Captain Larry Dyvad found that they weren't able to track our flights at all. They had a radar that was entirely aimed at looking at the missiles. To look at slow moving balloons with poor signal return was difficult for them. So we started off with making single target flights. I think we went to multiple target flights, and still didn't have any success, so I began putting radiosondes and then just audibly, as the tones would change, I would log it on a piece of paper. I'd count the pressure... Are you familiar with radiosondes?

Q: Somewhat.

A: The commutator with the pressure contacts, etc. I would count contacts and record it and you'll see in some of these flight reports, there's two different interpretations possible, depending on what the contact sequence was. An ordinary radiosonde is very good for something that's going one way. But for something that's going to go up and float, you can

have ambiguities. You don't know if it went up or down when you get the next pressure contact switch. You'll find that sort of uncertainty in describing the report.

So I'm quite sure that as a result of the failure of the radar tracking, I went back and started using radiosondes even though I didn't have the right equipment.

Q: You mentioned a few moments ago the Watson Laboratory gear, the microphones, and it was also Columbia that was developing the low frequency microphones. You had all of that gear on these balloons, is that correct?

A: No, not on all of them. That mention of a sonobuoy microphone, in the early... While the improved low frequency microphones were being designed and built, we flew on balloons, believe it or not, sonobouy used to detect submarines. We were flying sonobuoy microphones on the balloons.

Q: But the material that's been identified as Watson Lab gear shows up as very generic in all of these reports and things. That was all part of Mogul also, is that correct?

A: That's correct. I think what happened is because the Watson Laboratory radar wasn't very successful, I think we made a number of flights like this. I think I sent a sketch like that to you. We made a number of flights like that which was an unorthodox use of radar targets, and it's my opinion that the thing that caused the debris that was picked up was probably from a cluster of meteorological balloons carrying a cluster of targets.

When something like the idea of a cluster balloon was not only to carry the weight, but was also to keep the target in the air for a long time. If one balloon burst, we still would have enough buoyancy for awhile to keep the thing airborne. When it would come to the ground this would drag along the ground and get shredded, but this would still be carried downwind until another balloon would burst, whereupon this one would start getting shredded. So I think the explanation of why things were over such a large area was, indeed, because it was a cluster, it was multiple targets and cluster balloons.

Q: Of course the issue of the large area has been different in different reports. Different people have stated the 200 yards, Cavitt in his description, described it in terms of his living room which was not that large.

A: Even a single target, if it came down, wouldn't have filled a single living room, but a multiple target, begins dragged sideways and then blown transversally by any later winds, could have filled a reasonable area.

Q: And left pieces of debris everywhere. Depending on...

A: What the wind did.

The description that Brazel gives here that everything would weigh about five pounds when it was all together, is more than you would have gotten from a single balloon.

Q: Those were measured in terms of 300 to 500 grams or something like that?

A: Three hundred and fifty only. At that time we didn't have any bigger balloons than 350 grams, so the balloons would have been 350 grams.

Q: About one pound.

A: Correct. And the targets are nominally maybe a quarter of a pound.

Q: Those targets are only four to five ounces?

A: Here was the specification spelled out for it. Approximate weight, 100 grams. These, as I say, are somewhat heavier than the ones we had.

Q: You indicated that the balsa wood was coated with some sort of glue such as Elmer's glue.

A: That's my memory. It wasn't completely coated. Some of it was and some of it wasn't.

Q: Some of the balsa wood is fairly dense, as far as being durable, and one of the descriptions concerning this "wood-like" material was that you couldn't dent it with your fingernail. So if you have a fairly dense balsa wood coated with a glue, it may be quite possible that a person would not be able to put their fingernail in it.

A: That's correct. It's my memory that the reflective material was more aluminum foil than here. These are second or third iteration targets, as evidenced by this picture, wherever that picture is down in here of the 1948 flight. It certainly looks more aluminum-foil like.

Q: What year were you discharged from active duty?

A: '46.

Q: Before you left active duty, while you were still working with Duffy and Spilhaus, did they invite you to join the staff at New York University, or to continue your studies there?

A: I came back from overseas and was assigned to Colonel Duffy's, he had a little flight detachment assigned to him with a B-29 and a B-25 and some other aircraft. I ended up being the

executive officer of a flight detachment at Newark Airport. I got back from overseas in February of '46, I think. After getting out of the replacement depot, I got assigned back to Colonel Duffy and was assigned at Newark. I went on terminal leave something like July of '46 and went back to Georgia Tech and finished two quarters. I had two quarters to finish at Georgia Tech. While I was at Georgia Tech I began working with a microwave, an anonymous propagation research group that turned out, oddly enough, was under Colonel Duffy's direction. I didn't know it. It had nothing to do with my getting deployed there, but I had a student assistanceship working on that.

I made some report, and my name came back in front of Colonel Duffy in September, I think, of '46, and I got asked to come up to his office. I think he was still at Bradley Beach, Sharp River Hills Hotel there near Belmar, New Jersey. When I was there, who should come in but Spilhaus. They told me they had a problem involving balloons and asked if I would be interested in working with them, and they offered me a graduate assistanceship at NYU, and I wanted to go to graduate school in physics, so I was delighted to have that opportunity. That was either September or October of '46.

Q: So Spilhaus, since he was on the staff there, he invited you to come to New York University.

A: Yes, he did.

Q: So you went to New York University when?

A: Right after Christmas. January 1, 1947. The program had already started. I presume you have all the details. I have a copy of (inaudible) letter to General Spaatz. I presume you have all of that.

Q: I believe we do, but I'd still like to review it and make sure it's the same letter.

A: In any event, there was a big push. I guess after Operation Crossroads the first nuclear test in the Pacific was in July of '46, and Crary, because of the long range detection concept, Crary was sent to Ascension Island which is the antipode for, as close as they could get to the antipode for Bikini, and failed to detect any signal from Operation Crossroads, from the nuclear explosion.

Q: You mentioned detection. What drove the aspect of detection? Was it because of our test?

A: Yes, our test was being used as a signal source. The question was in order to detect any Soviet test, could we detect our own tests. So Crary was essentially sent to Ascension to see if he could detect the nuclear explosion.

Q: He was unsuccessful?

A: He was unsuccessful.

Q: What method did he employ?

A: Low frequency microphones on the ground. Are you familiar with the Krakatou measurements?

Q: No.

A: In 1883, Krakatou, near Java, made an enormous explosion and the pressure wave from that went around the world seven times, and was picked up and... There was a report, a big analysis by Lord Railey and others...

Q: A volcanic eruption?

A: Volcanic eruption. Here are the isocomes of the pressure waves from Krakatou as it went out. From the time it took the signal to go out and come back, he went to the antipode which is around Colombia or Venezuela, and came back as a big spherical wave. It went back and forth around the earth. The British investigators were able to show that there was a duct up around the tropopause, and the speed of sound, as I remember, was something like 310 meters per second instead of the regular 334 that we had at sea level. From that they could deduce the temperature of the medium in which the sound was propagating and it was something like minus 25.

Q: How was this detected as a pressure wave in that time frame?

A: Barograph.

Q: What year?

A: 1883. This is what prompted Ewing.

Q: I'm familiar with barometer-type measurements being used to measure that pressure wave and the fact that it traversed the earth, you said seven times.

A: Maurice Ewing had been an oceanographer at Woods Hole and had found a similar acoustic duct in the ocean. You may be familiar with what's called Sofar. In 1945 he wrote a letter to Spaatz suggesting this might be useful in detection of Soviet activity.

Q: The 1945 letter was kind of the initiative as a means of detection.

A: That's correct. That caused the Army Air Force to begin this research.

Q: How did you come in possession of it?

A: Todd. Todd does everything.

Q: Did he say where he got these documents?

A: Freedom of Information, I think.

Q: It looks like National Archives. I believe I have this letter.

So Ewing was at Woods Hole...

A: And was going to head up the geophysics department at Columbia. These are subsequent documents of people in the Air Force considering the desirability of it.

After Crossroads there seemed to be an enormous push to try to put microphones into the sound channel. During WWII, the Signal Corps had laid on them the requirement to develop a constant level balloon. It had not been very successful. I knew a bunch of people in the balloon branch.

The reason I got into balloons is that while I was working on this manual there was a great problem in the winter of '43 with the supply of gum rubber cut off, meteorological sounding balloons weren't flying very well. In the summer time, the balloons would go through the depth of the troposphere, but in the winter time, the balloons began bursting down at levels of 15,000 feet or so because the neoprene wouldn't stretch at low temperatures. Somewhere Spilhaus came up with the idea, talked to somebody in the Weather Bureau, that maybe you ought to heat the balloons. He told a couple of us second lieutenants, that I wonder if that would work. We got a blow torch and a mop bucket and we had a radiosonde, and he was in charge of the Air Force push on radiosonde technology. I was his leg man on that. We put a blow torch on a mop bucket and heated the water to boiling and flew the balloon. Much to our surprise, the balloon went to about 60,000 feet.

Q: So it stretched without rupturing.

A: It turns out that neoprene crystallizes and you can make it back into an amorphus state with high elasticity. Elasticity changes as a function of the degree of crystallinity. By heating, we removed that.

In any event, there was a group in Spilhaus's detachment known as the balloon [boilers]. The Signal Corps, it turned out, was very unhappy with this idea. They wanted no interest in it at all, and their manual doesn't use it. But that was my introduction, that's how I got attached to ballooning, as a result of doing this simple thing for Spilhaus.

It's of interest, in the Holloman report there's a big talk about boiling balloons. That's certainly a heritage of the association from our early balloon boiling days. When you look at the instructions on the modern balloon, you see that it is really a physical effect that can be controlled.

Q: You went on board at New York University, and you immediately set out, as documented in the reports, acquiring the various materials, [putting out bids], things of this nature. At that point you were working at New York University under the direction...

A: Spilhaus was the nominal principal investigator and director of the project, but he just turned us loose.

Q: So you were the project engineer?

A: I was the project engineer, and Schneider was the project administrator. We employed a lot of students, a lot of people that we could, and were a mixture of trying to develop a constant level balloon and providing service flights for Peoples. Peoples was entirely our contact.

Q: He would come to New York University?

A: He would go down to Red Bank. He'd call and say he wanted certain things, can you do it, so we made this flight out at Lehigh and then we made the Helgoland flight down at Red Bank, and he wasn't really happy. There were all sorts of constraints flying balloons in the New York City area even then.

Q: All the problems with air traffic and getting FAA, or their equivalent at that time, approval, etc.

A: So up in the stratosphere above my level, a decision was made that we go to Alamagordo, and there would be a big flight. We had balloons promised, but even ahead of that time people wanted to test microphones. He had Crary already, about from December of '46, I think Crary went to Alamagordo and ran a field station and...

Q: That field station was for ballooning in general?

A: For Mogul. It was more than that. Crary was operating sound-ranging microphones on the ground there. He was having bombs dropped off the New Jersey coast and trying to pick up the acoustic signals in New Mexico.

Q: He was having the bombs dropped in New Jersey, off the coast, and trying to detect them in New Mexico?

A: That's correct.

Q: What technique? Balloon borne?

A: No. We were the balloonists. This was all ground-based stuff. There was also an operation in Bermuda. Then later you'll find...

Q: Crary also initiated that?

A: He was in charge of it. He was running it. They went and got a whole bunch of 500 pound bombs out of the Earl Ammunition Depot in New Jersey. Later you'll find that they did a bunch down in the Canal zone. Then eventually they went to Alaska.

Q: This was prior to '47?

A: The New Jersey, and I think the Bermuda operation, you'll find a hint in this diary I gave you, you'll find a hint about Bermuda and so on in there. He was talking about trying to measure the sky waves coming in.

If you're interested, we can go extract, there's a paper in the Journal of Meteorology in something like '47.

Q: I believe I have that. Is that the same one?

A: No, this is by Crary.

Q: Crary did quite a few publications for Red Bank and then for Cambridge Labs.

A: Correct. But you'll find one, I think it's either '74 or '49. If you want we can go over to our library and make you a xerox of it.

Q: I'm familiar with that one.

A: It's very circumspect as far as classified matter.

Q: So Peoples and Crary had Columbia University affiliation?

A: Well, Watson. They were derived from Columbia. Both of them were derived... I think Peoples got his PhD under Ewing at Columbia, and Crary didn't get his doctorate until later.

Q: You said Crary's ground station was Alamagordo, but he was actually doing explosions in Alaska, off Bermuda, Panama, the Jersey coast.

A: In the late '46, early '47 era, he was in Alamagordo, in and around Alamagordo. He was very concerned about explosions off the Jersey coast and I think off Bermuda. The Panama Canal operation I think was not associated with Alamagordo at that time.

Here's a nice paper that came through courtesy of Todd. In '48 there was a big operation in the Pacific for Operation Sandstone, and we were heavily involved in that. Here's the Fitzwilliam... Schneider and J.R. Smith... My chief associate technically was a fellow named Dick Smith, James Richard Smith, who unfortunately, died two years ago. Smith and Schneider and some other of my associates went out on Sandstone to Kwajelin, Guam, and then Oahu.

Q: I've seen that in publication. I have to acquire it.

A: You can xerox it.

Q: Moving chronologically, Professor Ewing had affiliation with Woods Hole, and he was a meteorologist by trade?

A: No, oceanographer. He was a physicist, a geo-physicist.

Q: What was he doing at Columbia?

A: I think he ended up head of the Department of Geo-Physics. I don't know the details.

Q: For the AMC contract he was developing...

A: He, as we, were contractors.

Q: He was developing the acoustical...

A: That's correct.

Q: That acoustical gear, this is a later flight but it's a fairly good depiction. It shows payload here, and payload is mentioned in a lot of the reports without any further elaboration, what the payload was. That was primarily the low frequency microphones...

A: That was their euphemism for...

Q: So as not to be able to talk about what was then a classified payload.

A: Here are the sort of instruments. A chamber with a leak in it, and then a method of sensing the pressure inside the chamber. That affected the frequency of an oscillator that came to ground. That's the sort of thing that was developed at Columbia.

Q: Dr. Spilhaus also mentioned about trying to detect particulate matter.

A: That was another operation. A Tracer lab, have you come across Charlie Ziegler at Brandeis?

Q: No.

A: He worked for a Tracer lab and is just bringing out a book on the early detection system.

Q: That was Project Center. MX-968.

A: There was another one that followed on this to measure krypton. It was called Grab Bag in our lexicon.

Q: Did you ever hear of the project Bequeath?

A: No. Being a civilian and outside, I was more knowledgeable, essentially, of the intent and what was required rather than the project names.

Q: What type of clearance did you hold?

A: At various times I had Top Secret and Q and I don't remember exactly when I got various clearances. I also had a clearance with the CIA.

Q: So at this time in New York University you were cleared but you had no need to know.

A: I knew exactly what we were doing. I knew about Helgoland. I knew, just being an atmospheric physicist, I knew about the sound duct channel and I knew what we were doing, but I just didn't know any of the operational details and I wasn't concerned with them.

Q: From a security standpoint, did anyone ever discuss with you, other than the letter that I showed you stating that this is now unclassified, did anyone ever tell you never to discuss any of this with anyone?

A: I can't say they did.

Q: It was just a matter of enforcing the need to know what classified project...

A: I guess I was aware this was highly classified, and having been in the military was aware this wasn't something to be discussed lightly. But no, I can't say that...

Q: The reason I ask the question is there are some statements made in the various publications and books -- the popular press, about people being threatened not to talk about things they had seen or that sort of thing. I just wanted to see if there had been anything stated to you never to discuss any of the activities either related to this project or any other project.

A: There's a gray area here. I was certainly aware that what we were doing in Alamagordo was highly classified and was well aware, and I guess had been perhaps encouraged to have a suitable cover story to explain what we were doing.

Q: So you were encouraged by whom to have a cover story?

A: Probably by James Peoples, who was our scientific monitoring... As you may be aware, there is a former colonel, later General DuBose, who makes a statement that something was a cover story. When I read this, I was not at all surprised. I interpreted that as saying someone was covering up on Mogul. That was my interpretation when I read what was attributable to General DuBose. So from his point of view, there were certainly no threats, but we were aware we weren't supposed to be talking.

Q: So was it Dr. Peoples then who actually actively said use meteorology as a cover story, or...

A: I don't remember the details, to be truthful...

Q: But it was kind of a natural thing to think of in terms of meteorology?

A: We were careful around NYU with the various technicians we hired. We kept our knowledge of what we were doing to ourselves. It's certainly my memory that we were aware that this was classified, but we weren't threatened. We were just instructed that this sort of information was not to be passed out, even though the technical aspects we understood. So the answer is yes, we very well understood this was classified; and second, there was no physical threat or anything like that. We were instructed not to talk about it, and until Todd told me that Mogul had been declassified I was very reluctant to say anything about it.

Q: Anywhere in the early days were you ever aware of involvement by General LeMay?

A: Not at all.

Q: Not at your level. How about the [AFOAT-1] study group?

A: I became involved with them later on Project Grab Bag and others, and I knew a bunch of people in [AFOAT-1] -- Doyle Northrop... I knew that, but later ballooning got even more heavily involved in various classified things.

Q: Where were your duty locations involved with [AFOAT-1]?

A: Probably at General Mills.

Q: Not ever in Washington?

A: Oh, yeah. I visited people in Washington.

Q: Just for the record, Major Marcel later worked at [AFOAT-1]. Do you recognize him at all?

A: Not at all. The people I was involved with were civilian scientists. If we looked at a list of people at Northrop, Doyle Northrop sort of sticks in my mind, and there are other names I've seen related to that. Yeah, I knew that guy, but I never knew Marcel.

Q: So you went, moving into Mogul, you did go on the June and July field trips.

A: I ran them.

Q: How many did you go on? All of them?

A: I didn't go to the one in the Pacific. If you look at the planning on the Project Fitzwilliam, my name was listed as the person as being there. Then suddenly, I'm not. What happened, my people got taken away from me and I had to recruit brand new people to help me fly balloons into Alamagordo during the April and May 1948 operations. So I had new personnel, and we went up and down the Rio Grande Valley trying to launch balloons so they would pass over the ground stations at Alamagordo.

Q: During that early period, before you had your full complement of various types of balloons, did you ever use any of the Japanese balloons? We were given the impression there were at least a few of the Japanese balloons made available.

A: I got very interested in the Japanese balloons and communicate, and I have pieces of the Japanese balloon downstairs if you're interested in seeing a piece of it. And I've got translations. I met the chief of the Central Meteorological Office, a Dr. Wadati, and he put me in contact, so I have extensive files on the Japanese balloons.

Q: But were any of those used as precursors to Mogul or...

A: None whatsoever. That was part of a promotion that... When I went to General Mills, Winzen who had been the great entrepreneur, had gotten fired. He'd gotten caught in a prevarication about whether or not the Navy was going to provide money. He was replaced by a fellow named Frank Jewitt. Jewitt recruited me out of graduate school. We really promoted balloons. That's part of the balloon promotion.

Q: None of the Japanese balloons were actually used as far as a precursor to Mogul or anything like that.

A: That is absolutely correct.

Q: But you had them available for study, but you didn't launch them.

A: No, they didn't have any.

Q: In the New York University report it says that you were provided two Japanese balloons.

A: That's interesting, because I have no memory of them whatsoever. Spilhaus may have. But I have no memory that I ever saw them. In the spirit of being given proper scientific credit, in the paper that you have, the Journal of Meteorology Paper, we, heavily written by Spilhaus, credited the Japanese with doing, with their trans-Pacific flights. So what we were doing certainly was based, came after what they had done, and we didn't want to take credit away from them. But I'm told that on my own, completely free from this, I talked with Wadati and others on a Japanese balloon. I've never seen a Japanese balloon that I know of, I've never seen the payload, but I do have fragments of the Mulberry Favor.

Frankly, we did not depend on the Japanese balloons. The Japanese just preceded us. But we didn't pattern what we were trying to do on what the Japanese did. After all, they had opaque balloons, and my belief from the beginning is balloons ought to be transparent so they don't absorb sunlight so at sunset you don't have the cooling and the ballasting. So we owe nothing to the Japanese other than the fact they were ahead of us.

Q: You went on these field trips. When you left, getting back to the cover story, you were the project engineer. Did people come to you and say you need to put something together in case one of these things falls in somebody's hands?

You didn't.

Did you brief your people, your personnel, when they were there, that they if should go into town for food or something if someone says "Why are you there?"...

A: We were certainly secretive and not talkative, but at the same time...

Q: In other words, was there a developed cover story where everyone got together, discussed what you were going to say or not say concerning the various activities that were going on at Alamagordo and other locations?

A: That's a good question. I have no memory of such a thing. I'm just aware that we were under very strong stricture not to encourage speculation on what we were doing.

Q: So is that pretty much maybe a condition of hiring? I notice you used a lot of former military people. Did you just tell them at the outset, "This is a classified project for AMC?" Or were they not read on to the project at all?

A: By and large, people thought we were flying balloons for the Air Force.

Q: As far as they were concerned they were just launching meteorological balloons?

A: That's correct.

Q: They didn't particularly quiz you about the microphone you hung in there or...

A: No.

Q: The balloons that you did launch for Project Mogul and some of the other test balloons, without the actual instrument packages, did they have reward tags, "Return to New York University," or "Return to Roswell Army Air Field," or to Alamagordo Army Air Field or anything like that?

A: The ones that we wanted to get back, which were the test constant level balloons and the ones that had microphones on them, by and large, they did have NYU reward tags on them.

Q: Dr. Peoples, whoever was directing you, was there ever any concern voiced that this is a top secret object we're sending into the atmosphere and we're not sure where it's going to come to earth. Did they ever express any problem with that, that wherever it came down, it came down?

A: I think the argument was that when it came down, it would be mixed in with our other gear, and it was just part of a flight that was to be recovered by NYU. He thought nobody would interpret what those sorts of instruments would be.

Q: So the tags were kind of generic, like a meteorological tag, say. "This consists of meteorological instruments..."

A: "This is a research balloon flown by New York University..."

Q: Were you doing other research? When you went to New Mexico was there another agenda other than the top secret project?

A: None whatsoever. Our whole life revolved around the NYU constant level balloon project. We were developing constant level balloons, and the service flights for Peoples just sort of got hidden in that.

Q: The service flights were which ones?

A: The ones carrying the microphones.

Q: So specifically that term was used for the microphone flights from...

A: That's right. You'll notice when you look at this, that the flights out in the Pacific don't even get mentioned. There's just no report on the flights in the Pacific, and the flights in '48 that we made for Sandstone, there are some flight numbers recorded, but there are no details at all provided.

Q: That was Grab Bag?

A: No, Grab Bag was to grab stratospheric air to measure the krypton 85...

Q: Essentially particulate detection and gaseous...

A: That was gaseous. The particulate was, I think we were less involved in grabbing particulates. There have been thousands of flights made, and certain people did carry cascade impactors and other things, but that was a minor part of what we did, whereas Grab Bag was a very measure effort.

Q: That was in '48?

A: That was more '50 odd.

Q: Was that Fitzwilliam?

A: No, Fitzwilliam was entirely acoustic detection. Again, very long range detection. Fitzwilliam was spring of '48. There were various code names, and thanks to our friend Todd, I've learned about the code name got termed Black Heart and a whole bunch of odd names...

Q: Black Heart, Rock Fish. He may be wrong on that part. He may be right, but...

A: I heard Mogul got converted into Rock Fish. But I heard the detection part of Fitzwilliam ended up being called Black Heart.

Q: He may be in error on that.

A: As I say, I'd been much more concerned with the technical aspects than the military operations.

Q: This is one of the technical reports and it's talking about the various flights, and this is the report that lists all of the numbered flights and it talks about, it says, "Excluded are the flights made to test," it's technical report number one,

"Excluded are those two tests' special gear in launches which were not successful."

A: Right.

Q: So the special gear that's referred to here is the microphone gear?

A: Yes, sir.

Q: There's another passage that talks about the intelligence gear. Was that considered also...

A: Did we make such a faux pas as that?

Q: It's in there.

Q: I have the classification letter from July of '46. You might want to review this. Maybe your friend has shown that to you.

A: No, I've never seen this.

Trakowski argued that even the name Mogul was classified, and he said it had the same classification as the Manhattan Project had, which surprises me, because in various reports that Todd has sent me, such as the monthly progress reports from the people at later Holloman Air Force Base, Mogul appears in things that are no higher classification than confidential, but Trakowski insists that Mogul was super classified.

(END OF SIDE)

Q: This is a copy of the letter you wrote to Colonel Weaver. One of the things that you talk about in this letter was that the radar test flights were not reported, which is exactly what we were discussing a moment ago in your kitchen. Would you go over again what you just described as far as this particular test flight that occurred? What we just went through in there.

A: As I said initially, the essence in trying to develop constant level balloons, we needed to know what the altitude was. At the same time, we were under a lot of pressure to carry the test microphones for the Watson Laboratory and Columbia people. We got into an operation at Alamagordo in early June of 1947, in which we were required to make flights in which the tracking of the flights would be provided by the Watson Laboratory Radar that was already in place at Alamagordo for tracking the V-2s and other rockets the Ordnance Corps people were flying over at White Sands. So we came down to fly balloons in early June, in which the tracking of the flights was to be done by radar, tracking corner reflector targets, which I think we brought with us. I don't have any evidence of this.

Q: So you made your plan in New York to fly... Your primary research was the acoustical detect...

A: That's correct.

Q: Secondary was refining the technique of constant level balloons.

A: And that was on hold until we got the delivery of the polyethylene balloon that was scheduled for the end of June. So the first of June we came, really, just for the test flight of microphones, doing service flights for Watson Laboratories.

Q: To fly the balloons in association with...

A: To fly meteorological balloons, tracked by a Watson Lab radar on the ML-307B targets that I think we brought with us.

Q: And you launched these balloons in conjunction with V-2 firings?

A: Those went independently. Albert Crary was monitoring the V-2 firings.

Q: That was with the ground microphones?

A: You're right, I beg your pardon. As you'll find in the diary, that we launched Flight 8, these cluster balloons, we launched those at 3:00 o'clock in the morning for a V-2 firing. You're quite right. I'd forgotten that. We launched those in the morning, then the rocket got scrubbed while Flight 8 was in the air, and we were out of plastic balloons that day in early July -- this is jumping ahead to early July -- and we inflated meteorological balloons for the delayed firing of the V-2 rocket on the afternoon of July 3rd, you'll see. Then there was an accident over at White Sands and the V-2 got scrubbed a second time. What was Flight 9, we launched Flight 9, as you will see in here, as a dummy flight, and it probably had radar targets on it.

Let me just read this. This is Crary's summary for the week of 30 June-5 July 1947. "Balloon tests 7, 8, 9, and 10 off this week. Test 7 slated for July 1 postponed to July 2nd because equipment not ready. A hundred tanks with helium obtained from Amarillo Monday evening. Trakowski went over in a C-54 and picked them up. Also radiosonde receivers set up by NYU but sonobuoy not operable. Test 7 at dawn, July 2nd, with Pi Ball. One hour, first falling with the autolights. Winds were very light, and balloons up between base and mountains most of the time. Included a cluster of met balloons, followed by C-54 several hours, and finally landed in mountains near road, south cloudcroft. Before gear could be recovered, most of it had been stolen. Station operating in north hangar, Cloudcroft and Roswell. Shots made repeatedly at Site 4 and picked up goods

from north hangar and from Cloudcroft for awhile. Nothing from Roswell.

"On Thursday morning, July 3rd, a cluster of GM plastic balloons sent up for V-2 recording, but V-2 not fired. No shots fired. Balloons up for some time."

Q: What is a shot?

A: Explosive on the ground.

Q: You were doing explosives on the ground in New Mexico too?

A: Crary.

Q: So Crary would give you the signal, he'd say at 0400 I'm going to launch a balloon, and at 0500 I'm going to...

A: No, he wouldn't launch a balloon. I'd launch a balloon. What Peoples would do is say I want a flight up tomorrow morning. So the NYU group would get ready to make a flight, and then Crary would go out with his crew and fire explosives up and down the Tulerosa Basin while our balloons were in the air.

Q: So you had multiple explosions on the ground, the V-2...

A: And explosions on the East Coast.

Q: On the East Coast, Caribbean, and you had those timed so you knew when those were going to take place and you were simply waiting for...

A: They had them timed and we balloon types just fit into the schedule. But the master, the timing, bringing all this together, we knew nothing about. We were just scheduled to fly balloons.

Q: But you did want to launch early morning for the light winds.

A: We did want to launch early in the morning for light wind. We had freedom to tell them what we could do and what we couldn't do. We actually on this, in addition to everything else, we actually flew blocks of TNT on free balloons and fired them while we had other balloons in the air.

Q: Did those have radar targets on them also?

A: Probably.

Q: Were those detonated by...

A: By a pressure switch.

Q: Were those tracked? Was there some sort of log that would tell you where those particular balloons were? You wouldn't want to just release TNT to float anywhere, would you?

A: They wouldn't float. The balloons would just go up until they burst. And we were on the edge of the restricted area. So the answer is yes, we did.

I'll have to get back to this. The radar tracking turned out to be abysmally poor. I don't know why, but they were abysmally poor. That's why I got off onto this part of it. And when you asked me the V-2 question...

Let me finish this, and then we'll get back to what you asked.

"Thursday morning, cluster of GM balloons sent out, V-2 not fired, no shots fired. Balloons up for some time, no recording. Pi Ball showed no West winds. Balloons picked up by radar, WS." I presume that means White Sands. You'll find this hard... and hunted by somebody's name I couldn't get. It looks like Maryalls' "C-54, located on Tulerosa Range by air. Out PM with several NYU men by weapons carrier, but we never located it. Rocket postponed until 7:30 p.m. Thursday night," which was the third. "But on last minute before balloon went up, V-2 was called off on of accident at White Sands. Sent up cluster balloons with dummy load. Balloon Flight 10 on dawn, July 5th, had gone out with C-54, again with Moses and Dufeld to hunt for Flight 8 but not sure was found then."

Then I added a note here, "Flight 8 was never recovered."

"C-54 went to El Paso July 4th and picked up single smith plastic balloon and GM cluster plastic balloons."

So the answer is yes. We did try to coordinate the balloon launchings for the V-2 firings, and Crary would also take that as a time of opportunity to go out on the desert and fire TNT. He had vast stocks of explosives available to him.

Q: Was that primarily on the White Sands range, or did he go out into other areas, say Northwest of Roswell? Did he contract with any of the ranchers to use these locales, other than the actual missile range itself?

A: I think all the explosions he made were coordinated with the White Sands Proving Ground people. Alamagordo Airfield, later Holloman, was just on the fringe of the proving ground at that time. Crary sent his men to all sorts of places -- over to Roswell, to Artesia, to Hagerman, up and down the Pecos River area. He had a place you'll read about, Fabians, Texas, which turns out to be just down the Rio Grande from El Paso, maybe 50

miles. Then he had Don Edmondson went to Silver City frequently. Then he had some place he called Donna, Las Cruces is in Donna Anna County, but I don't know where his Donna site was. But I think he had microphones scattered all around in central New Mexico and West Texas. But the explosions were all created either on the White Sands Proving Ground, or there were V-2 rockets, or they were things coming from...

I won't take the time now, but he talks about cruises, which apparently are, maybe they were cruisers firing off the Jersey coast.

We got off into this, we were talking about tracking, and we went down to, in early June, to make service flights which were to be tracked by radar, and the radar was unsuccessful. It's my memory that we made a number of flights just to test out the radar. These would not have had a reward tag on them. These were throw away flights. Once a target like this comes down from high altitude or drag, you don't want it back. It's my memory we didn't want to have anything traced back to us, if we weren't going to go out and pick it up.

Q: So you just kind of let the material lie wherever it fell?

A: We shot a balloon into the air and didn't want to do any more. There are some pictures of our going out to recover things. On one of the early flights we went out east of Roswell, and I remember beyond the Bottomless Lakes, going out in oil well country, picking up one of our flights that had come down. We aggressively tried to recover our own flights.

Q: So were you directed to that location by aircraft?

A: By the aircraft.

Q: Did they give you a lat and long, landmark?

A: We talked to them by radio. The transmitters on these microphones were so low powered that, believe it or not, they had B-17s just orbiting under our balloons with receivers aboard the aircraft, and we, of course, would talk to the aircraft, and they'd tell us when things would come down. So it was a coordinated operation.

Q: So you had explosions or V-2 going through. So the aircraft had recording devices. You had the acoustical pickup on the balloon and the aircraft had the recording device that would record the sounds.

A: That's correct. Would record the signal from the balloon.

Q: In what media was it recorded on?

A: Brush recorders. [Strip charge] recorders feeding out at high speed. You'll see in here, you'll see the sort of records.

Q: The graphic representation.

A: The recorders looked like that.

Q: So that was recorded on the aircraft and then...

A: That's correct. As you'll see, they said they had receivers at Roswell, at Alamagordo, and they had them on the airplane.

Q: But most of the detection was via the aircraft because of the low power receivers.

A: Most of the reception, the detection, was really... The balloon received the acoustics, and sent it down by radio to the aircraft. It often didn't work. That was the reason why for Operation Sandstone in April and May of '48, we went up and down the Rio Grande Valley... Here are some of the pictures. There's a ground cloth for the balloon to be laid out. There's a balloon being inflated, just getting ready. So we tried to get up wind.

That's a device from White Sands that was picked up around Carazoso and was reported in to us, and we thought it was one of ours. So I took a weapons carrier and drove up there. We were aggressively trying to recover our equipment and that just happened to be something that was on the ground. The technician that had been in that group, remember the [Marginal] tape, Herbert Crow. That's a picture he took when we were aggressively trying to recover a load. That turned out not to be ours.

Q: What is it, and who did it belong to?

A: It probably was flown on a rocket or by Marcus O'Day who was the chief scientist at Watson Laboratory. Dr. O'Day. You'll see, when you read the Duffy thing, where Duffy thinks maybe there were things that were flown by Dr. O'Day. Anyway, that just happens to be a picture in the collection of NYU photographs.

Q: So there were a lot of other people flying balloons or launching...

A: Not balloons. We were the only balloon flyers. That came down by parachute. But there were a lot of rockets being flown in the early days there, and a lot of high altitude aircraft. Duffy says there were dropsondes.

Q: So it could be that some of the material found may not have been associated with a balloon. It is possible it could have been some other type of material. But the description that

Brazel gives the impression that it is the smoky rubber of a balloon that's been in the sunlight.

A: That's circumstantial. That fits exactly with what would have been done, and orthodox use of radar targets would not have produced what he found. But you're quite right, there's debris that was reported to us that...

Q: ...some sort of cylindrical instrument, though, that's obviously an instrument package of some sort.

A: It had a plexiglass, it looked like maybe it had a UV sensor. There was some optical equipment under the plexiglass dome that was shattered...

Q: You're familiar with the popular literature about the various crash sites. There's one crash site, two crash sites, three crash sites and all that craziness?

A: Yes.

Q: What I'm thinking is we may have two incidents here, where they collected your debris from your radar targets, and then there may have been another something else not related to a balloon.

A: There could have been other things from White Sands. This was on the edge of the proving ground. There's a story behind this, and that is that a rancher, whose land had been taken from him to form the proving ground, had cattle that were still on what had been his land. He had found this while he was looking for his cattle, I can show you on the map if you're interested. Anyway, he called in to Alamagordo about this. So I went up to see if it was one of our missing balloons. While we were there, a range security guard came on the rancher and really castigated him for breaking the law, coming back onto the range. So this was really on the range. It would be hard for me to understand how the sort of operations, which I knew, could have fallen as far away as these other sites you talk about. This was really on the northeast corner of the range, just west of the town of Carazoso.

Q: So that's not too far from here.

A: Here's the northeast corner. [Looking on map] Right on this road, right about there is where that load there was found. Here is where the Brazel finding was, just north of this bend of the road here, and there's Roswell.

Q: You're talking in terms of sites around Corona and in that vicinity. So it's quite possible that there had been other types of debris from the proving ground or...

A: As I say, I find it hard to think that something... While we may have been flying TNT on balloons and being very carefree about it, I really doubt that a thing of any military significance would have fallen this far away from the proving ground. It could have, but...

Q: Other than your balloons.

A: Oh yeah, those first flights we didn't even coordinate with CAA. Peoples was so eager to go get those measurements, that these were going to be flown from a restricted area and he didn't worry about it. We later, before the Civil Air Board in El Paso, but that was two or three months later.

Q: When you went on the field trips, what was the chain of command at that point when you arrived? Who did you report to?

A: We were somewhat self contained, but we got housing provided by, I guess Crary was our contact, if you will. Some way or another, barracks were made available for us to live in at Alamagordo.

Q: Would anyone at Roswell Army Air Field have known about your activities, what your purpose was?

A: Not at all. In fact, we went over and tried to get into the weather station at Roswell and because of the atomic bomb security of the 509th, as I remember, we couldn't even get on the base. We drove up in a weapons carrier to the Roswell Army Air Field, and tried to get on the base because we wanted to go to the weather station, wanted to see if we could put a radiosonde receiver there. As I remember we got turned away.

Q: But you ultimately did put a radioson receiver there.

A: In a motel. We just worked out of motels in Roswell.

Q: I thought I saw you had a radioson receiver on Roswell Army Air Field.

A: Again, forgive my memory, but I do remember being turned away. But if you can find it, I'd be glad to have my memory refreshed.

Q: I saw that you had a copy of the 509th Bomb Group history. In the 509 the Bomb Group history from September I saw a meeting where Dr. Peoples met with LTC Joe Briley, 830th the Bomb Squadron Commander, 509th, Air Group Roswell. Do you know why Dr. Peoples would meet with the squadron commander of a B-29 outfit?

A: Only if he wanted to get in to put a receiver on the base there. That would be my guess. We had a big operation. We went back to Alamagordo in September. We had our first 20 foot

diameter General Mills balloons. We had a very successful set of balloon launches in Alamagordo in September of '47. My only guess is trying to have a down-wind receiving station.

Q: There are some other names mentioned that I can't recall.

Q: What about then Colonel Blanchard and General Ramey? Do you think they may have had any knowledge of what your ultimate purpose was?

A: I think not. I want to say something about Colonel J.D. Ryan. He was Chief of Staff of the Air Force later, but "Dr. Peoples, Murray Hackman, and First Lieutenant Thompson from Air Material Command, were out at the field to inspect Air Material Command installations and to confer with LTC Briley."

Well, well. Hackman was one of our radiosonde operators. There's Colonel John D. Ryan right there. That's interesting.

On the morning of this famous press release, July 8th, in The Roswell Daily Dispatch, there is a statement about a flying disc being identified, and Colonel J.D. Ryan who is on the staff of 8th Air Force said that the Air Force was now using radar targets to measure winds aloft in some stations.

I find that of interest because apparently in reading some of the various things that happened in General Ramey's office, apparently someone that afternoon did think this was a radar target that had been brought in. But the Roswell morning paper clearly showed that there was a knowledgeable person in Fort Worth.

Q: Is that in the article, the 8 July article, that Ryan made the statement?

A: Yes. Maybe not the article you're talking about.

Q: Is this the one that William Haut...

A: No, this is that morning, not that afternoon. (Pause to look for clipping) There's Newt Goldenberg, you mentioned him earlier in one of our conversations. That's one of our altitude controls.

Here's the morning paper, "Report flying disc found." Down here is about Colonel J.D. Ryan, and he mentioned the existence of radar wind measuring equipment in the Air Force. If you want a copy of that...

Q: Then there's, subsequently, no mention of the radar targets until General Ramey discusses it on the 9th, talking about the material being a balloon.

A: On the afternoon of the 8th. It may have been published on the 9th, but...

Q: You're right. Evening of the 8th. Examination by the Army revealed last night, a high altitude weather balloon. General Ramey, Commander, 8th Air Forces, cleared up the mystery.

A: In these pictures here, don't show these flaps. This, I think, is my step ladder that I used to reach high targets, when we have these big balloon trains going way up in the air. Here again, is an unorthodox use of radar targets. We did that, and as far as I know, other people didn't.

Q: Did you ever use radar targets with the polyethylene balloons?

A: Yes, sir. In fact somewhere I have a picture where we flew a missile, we launched a missile for O&R Special Devices Center in 1949. I have a picture showing the targets up and down the balloon train there.

Q: Do you remember trying to pin down some of these flights that could possibly cause this misunderstanding? You talk about putting a target with the neoprene balloons, but at that time you also launched them with the polyethylene?

A: This picture I showed you right here. This is a polyethylene balloon.

Q: So you used a visual by the aircraft to watch the balloon? It would circle underneath.

A: The aircraft circling underneath were really to pick up the microphone signals. That was part of the Watson Lab operation. Our operation, we depended on radiosons and where we could get radar tracking for tracking air balloons. But the aircraft operation here was entirely to support Project Mogul. We didn't consider ourselves Mogul because I didn't even know the name.

Q: The summary of flights...

A: That's one of the flights with the mixed interpretations because of the radiosondes.

Q: In one column it says "tracking percent." Then sometimes it will say by aircraft.

A: That's true.

Q: So "aircraft observation", was that a visual observation or an electronic?

A: That's really saying did we have aircraft on it or not, and what percentage. Here the B-17 was on it for 40 percent of the time. Indeed, that was the aircraft tracking for the Mogul operation.

Q: That was for the electronic data gathering.

A: That's correct.

Q: Not observing the balloon to tell you where it went down.

A: That's right. Well, we did have the aircraft stay as long as we could. As long as we could end up with that very expensive aircraft chasing an air balloon, we were happy. On the flight that came down east of Roswell on one of these, Flight 5 or so on came down east of Roswell, the aircraft spotted it on the ground for us and told us where to go to look for it.

Q: About 17 miles east of Roswell.

A: Then we had another one, Flight 11...

Q: That's the one that appears to come down northwest of Roswell.

A: Correct.

Q: It appears to have almost come down exactly where they're talking about.

A: That's right.

Q: That's the one where you provided a depiction to Colonel Weaver.

Q: No, that's another one.

Q: That's an earlier one, that's right.

A: Where is that old NYU report? (Pause)

Here it is right here. More or less due west of Walker, Roswell Army Air Field.

Q: Then this graphic conflicts with this graphic, which shows Number 11 coming down... Is that circle the Roswell reporting station?

A: That's about right.

Q: Is this circle a weather reporting station which would be Roswell?

A: You're right.

Q: This has it coming down northwest.

A: What's the origin of this?

Q: It's in the back of one of the reports.

A: It looks to me like it may have been out of this report.

Q: Not every report had this graphic depiction like this which was number eight.

(Pause to look through documents)

A: With those numbers it wouldn't have been in that first report because these flights were much later.

Q: Technical Report No. 1.

A: Right. And Flight 58 and 55 aren't going to be in that early report. They occurred after that report was written.

(Pause)

A: I would say what was in that first report is more accurate than this. This, I think, occurred after I left NYU. It's a general summary. Flight 11 was a very important flight. They got very important data on it -- Crary and Peoples.

Q: Spilhaus based his article from Journal of Meteorology on it.

A: Right, and he wrote a paper in the bulletin. The fact that the balloon trajectory has this hook in it when it went over the mountain ridge...

Q: That's obviously the [ano-cyclonic] winds aloft.

A: Exactly. So he and Bernard Harwitz were very excited about the fact that the balloon at nominal constant level, had a change in direction when the air was forced over the mountain barrier, and they published a special paper on that. So everybody was happy with this flight.

As soon as that flight was made, that was the 7th, and we went home on the 8th.

Q: That would be the reason why there would be no one there in the area who could explain this debris that was brought in. There were no experts there who dealt with this particular type of material or radar reflectors.

A: There was really no contact, at that time, as far as I know, between Peoples and Roswell, and there's no way Roswell, other than my memory of getting turned away by the MPs at the gate, there's no way that the people at Roswell would have known what was going on over at Alamagordo. When we sent people to Roswell, Hackman worked out of a motel to receive.

So the more puzzling thing in line with what you say comes from Crary's diary. Here's what Crary's diary says: "Alamagordo. Balloon Flight 11A, off at 5:07. Big plastic balloon with small auxiliary plastics," etc. "Watson Lab and gear." "Followed" (inaudible) "receiver until about 11. Picked up on radiosonde receiver at Roswell then followed. Then came down. At 10,000 feet, cap should have punctured plastic. Then it came down near Highway 70, between Roswell and Tulerosa.

"Second balloon, met balloons with radiosonde up about 6:30. Third balloon with two and a half pound stick of TNT and cap set by pressure element set to fire at 35,000 feet, up at 6:20."

Q: What day is that again?

A: July 7th.

"Surface bombing at Site 4 from 5:45 to 8:45 at 15 minute intervals. (Inaudible) followed main receiver only three-quarters of an hour, but followed radiosonde about three hours. Thirty-five thousand food implosion? off about 6:55. Vivian got instructions for completing work on Flights 1 to 30 and packed all records and photo. Sent off TWX regarding Bermuda flight and wrote up memo on it. Worked with Eileen on April 1st rocket plotting HD5 HT SST, whatever [that is]."

July 8th. "C-54 off about 10:30 with 23 people, all NYU, Watson Lab including Vivian, Eileen," and somebody else. I can't tell. "Lieutenant Thompson, Edmondson, Reynolds and myself left. Wrote a report on East Coast flights for Peoples."

Here's 9 July, the time this occurred at Alamagordo. "Worked today on balloon flight. Studied Watson Lab records of them briefly and wrote memorandum to Peoples about results. Left in car this PM later. Flat tire between Roswell and Tulerosa, and stayed there."

July 10th. "Changed tire and went into Roswell. Bought new tire. Off to El Rino, Oklahoma today. Stopped in cafe in Hereford, Texas and met Danny Hard from UGC. Went up to office and saw Bob Cowden, somebody in charge, and supervisor."

That's the end of it. So there's no hint that Crary was involved in any coverup such as this clearly is. This is a coverup right here because they talk about our operations, they talk about our balloons we thought went to Colorado,and they all claim it to be part of Pritchard's radar operation.

Q: But he wasn't launching balloons.

A: He wasn't launching balloons.

Q: So where did they get the equipment to take this picture? Did you leave equipment behind?

A: This is right outside of the hangar.

Q: Those are your people?

A: It's our equipment and my stepladder.

Q: Did you leave equipment there?

A: Yes. Everything

Q: Because you expected to return.

A: We were just going back...

Q: It looked pretty tricky. How did they know how to do that?

A: I just don't know anything about the hierarchy above us. I do know that I worked carefully with a guy named Larry Dyvad, a pilot, who later became a private pilot, running a fixed base operation in Alamagordo, and got killed 20 years ago. But I know I worked with Larry Dyvad whose name you'll see here. I don't remember Pritchard at all, but Dyvad was my contact with the radar. I know they didn't have balloons or anything else, yet they talk about boiling balloons there.

Q: So when you returned in September, did you see that somebody had tampered with your equipment and used up some of your balloons?

A: If it did, it didn't ring a bell.

Q: And no one mentioned it to you. No one said hey, look, we had to do something while you were gone.

A: I think we were just some ignorant, little innocent graduate student contractors on a military base, and things were going on that we didn't know anything about.

Q: So no one approached you to say they had used some of your equipment?

A: Not at all.

Q: This photo that's depicted here n the July 10th Alamagordo News, this could have been taken during one of your actual launches versus...

A: I think not, because they say, the whole article is this was a demonstration. I would have thought, since Crary was a senior person and he and Peoples, Peoples was our contact with the base. But other than Dyvad, we had no real contact with anyone I remember. I do remember being very disappointed with the radar.

Q: If this were a demonstration sometime on the 9th or 10th of July, prior to this being published, they talk in terms here of these radar reflectors. These particular radar reflectors, as having labels on them. The radar reflectors you were using, did they have any type of labels talking about being property of U.S. Army, or Watson Laboratories?

A: None that I know of. We were strongly encouraged not to mix in the Air Force with what we did. Everything we did had an NYU label. I may be able to dig back in my file somewhere...

Q: So they may have had an NYU label on it. Even the service ones.

A: On service, but on radar test flights, there's no way we would have put a label on.

Q: Those were just shakedown flights. You were just saying hey, what's going to work best to get the data, so let's use some of the equipment we have and see what works, so you'd have someone on the radar and say yeah, this configuration works, this one doesn't. That's what you were doing. Then later on you refined your technique...

A: What we would do is we would put up things and they'd come back and say it didn't work. So we'd scratch our heads and do something else. But we were running that end of the balloon end of the operation. Nobody else was flying balloons around us. There may have been a radiosonde operation out over White Sands, but there was not one, as far as I know, at either Roswell or Alamagordo. If there had, I would have used them because we were using standard AMQ-1...

Q: But you did coordinate with Big Spring, Texas.

A: Did we?

Q: It's in the report, saying you guys, when you came back to New Jersey, you were sending thank you letters to various organizations that helped you while you were in the field. Big Springs, Texas; some other places that you had coordinated with.

A: Thank you...

Q: The New York University reports are very voluminous. There are three big bound volumes. I have the originals with your signature.

A: You're making my point, that there probably wasn't any other nearby radiosonde station for us to receive things. I'd forgotten all about Big Springs, but I'm sure we made every effort we could to get radiosonde reception.

Q: Can you think of, just in general, any other explanation for what became the so-called Roswell incident, other than what we've discussed here as far as potentially your balloon project, which at that time was a very secretive project. Is there any other explanation you can think of?

A: No, and the particulars of this case are sufficiently nearly unique, that I think no one else had anything that could have fit into providing these results. No, we were doing something that was unorthodox, using targets that, as far as I know, had not been flown before in New Mexico. There's no way that the rancher could have ever seen one. And there's no way that either Major Marcel nor General Ramey or General Ramey's people could have come up with providing a radar to substitute for the real debris. I think there's a very high likelihood that the unusual things we were doing provided this debris.

However, all the other stuff that's in, and a lot of the material, I can't explain bodies or material that can't be [folded] by a sledge hammer.

Q: Let's dwell on the bodies just for a second here. It turns out that during this time frame, 1947, 1948, 1949, there were numerous aircraft accidents, a lot of fatal aircraft accidents, in this general vicinity. Did you all ever come across any of those?

A: No, sir.

(END OF SIDE)

Q: There was an accident that took place right out of Roswell, a B-29, two B-29 accidents that resulted in fatal crashes. We were wondering if maybe over time people were beginning to think in terms of those fatal accidents, which essentially scattered body parts, small parts, over areas, where people were getting confused with what occurred in those aircraft accidents with the sensationalism of this UFO story.

A: As I said in my letter, all of us went back to NYU on the 8th of July and we heard about that afternoon, and we just thought it was one of our balloons. All of us that were in that group have held onto that view for a long time. I do have Crow's letter here. He apparently joined us for that Operation Sandstone pickup crew in '48, but he knew that we knew that we

thought the Roswell incident, so-called, was caused by one of our balloons.

Q: Did anyone ever mention it to you once you returned? Did any of the Red Bank folks mention it to you, or even in passing, or told you that maybe you'd better tighten up your procedures or anything of that nature, or a memo?

A: I have no memory. I do think that Peoples had the idea that it was one of our balloons, and it wasn't a matter of tightening up our procedures, it was just one of our balloons we couldn't recover. As you'll see looking at Crary's diary, there was no frantic effort to recover the earlier flights, even though they had microphones on them. I read to you one about some equipment had been stolen by the time we got there. As you can see in the diary, there's no record that there was any major problem.

Q: So even though the equipment was taken, there was no shroud of secrecy, the MPs didn't come out and close down the area or anything of this sort.

A: No, not at all.

Q: It was just expected in the normal course of research . Expendable equipment.

A: Expendable equipment.

Q: And you had no fear that it was going to be taken by enemy agents or...

A: No, the biggest fear was the thought of loose talking, and we just didn't talk about the purpose of this. We certainly did talk a lot about our balloons, and there was just no security or no concern. We were flying constant level balloons.

Q: For pressure and temperature...

A: For meteorological trajectories. A lot of interest in trajectories.

One thing I should mention is that after I had visited from William Moore around '80 or '81, I wrote Ro Peoples and at that time Jim Peoples was in the Geology Department at the University of Kansas. I wrote him and got a letter back from Ro Peoples saying that he had died. So I wrote her back and said there was considerable interest still in this Roswell incident, and did he ever get called out... I do know that on occasion he got involved in classified things and left us. I asked her did he ever talk to her about anything regarding this debris that had been recovered. Her letter, which I perhaps can find somewhere, was the fact that no, he thought that flying saucers were a bunch of hooey, and he had a very low opinion of people who believed in

flying saucers. I did get a letter back from Ro to the response that he had not been, as far as she knew, he had not been involved in any classified identification of something. That had occurred to me that things could have gone on that I had no need to know. I tried to extract that.

Q: So you had no recollection or strong recollection of him, when you got back to New Jersey, discussing it. It caused a lot of fuss.

A: I'm really surprised at this newspaper story because implicit in this is the idea that someone provided a good cover for us, and yet Crary's diary doesn't show that he was involved in it, and I wasn't aware that my contact, Dyvad, was privy enough to our operations to have carried this out. So this is a bit of a mystery to me.

Q: What would you speculate, how would someone, just circumstances, coincidences, or intentional?

A: It's very clear that it was intentional, and there was a better security operation going on than I appreciated at the time. That would be my assessment.

Q: So you believe that someone was privy to your activities...

A: Trakowski was there. I had forgotten, but he reminded me that he had gone on the C-54 to pick up the helium at Amarillo. I asked Trakowski had he been involved in manufacturing a cover story. He kept saying how important Mogul was, how highly classified it was, and how he was really wheeling and dealing. He apparently went down to Fort Bliss, to the commanding general there -- I guess he was a captain at the time -- and had no trouble talking the general into releasing something like maybe several hundred 500 pound bombs for this. At the same time, Trakowski has no memory of a coverup.

Q: He didn't have participation.

A: Whether he was on that C-54 that had 23 people on it or not, I don't know. Crary's list of the people left, there was only one military type, a Lieutenant Thompson, in what you have here.

Q: Who did you report to?

A: Peoples.

Q: Then getting back to talking about quarters and things like that, did you have to go introduce yourself to the commanding officer at the base, or...

A: That's the surprising thing. As far as I know we just never interfaced with the military.

Q: Where were you actually operating from?

A: We operated out of the north area of Alamagordo Army Air Field. This hangar right here, which was a big wooden hangar, on the south side of the ramp in the north area.

Q: That was arranged by Peoples?

A: Crary was already resident there when we had arrived.

Q: That's right. He arrived first to establish the ground stations first.

A: Correct. As you'll see in this, he was already firing explosive for the GR-6, the various sound-ranging microphones.

Q: Did he have a cover story for those ground explosions and the microphones?

A: I don't know. There were very few enlisted men on the airfield. As Trakowski said, it was about to be closed. There was a motor pool, because in the stuff Todd has dug up, there were a bunch of weapons carriers being requisitioned. We certainly had some brand new, good ground transportation that was just turned over to us. We civilians were driving weapons carriers to carry helium around, and to go into town to get meals, etc.

Q: So you operated from Alamagordo Army Air Field. You did not operate out of White Sands.

A: That is correct.

Q: There is a difference.

A: A very strong schism between the ordnance people across the valley 50-odd miles at the proving ground, and the skeleton group at Alamagordo Army Air Field.

Q: So there weren't many people at Alamagordo.

A: Correct. The main people I have a memory of were the people operating what sticks in my mind as either C-5 or an M-5 radar. I knew the Signal Corps designation, the SCR-584s and 270-s, etc., but this was some new radar that had a bigger dish on it and was on the north side of the ramp. It would have been... This is looking toward the south. You can see here, those are some old abandoned, those were barracks used to handle air crew during training of World War II. They were all closed and dusty and we didn't use them. We were in barracks down somewhere on the main base. But we were just in an enlisted

men's barracks down on the main base and there was a mess hall that we ate lunch in, ate our meals. We were up at odd hours, as you can see, these 3:00 o'clock launchings.

Q: Who did Alamagordo report to? You indicated it was Fort Bliss?

A: No. There was a commanding officer, and I'm not sure which command he was in, but the people in the north area were all, if you will, tenants. We didn't use that word, but we were all associated, one way or another with Watson Labs.

Q: So Trakowski then, his reporting chain was...

A: His reporting chain was Watson Lab to Colonel Duffy.

Q: There was no real interface, Trakowski had no real interface with the Alamagordo people or anyone else around 8th Air Force.

A: There were some fancy orders that gave him a position to talk to the commanding officer and get what he wanted, to arrange what he wanted on the basis of orders out of Headquarters Army Air Force.

Q: While you were operating, doing your procedure, did it take a security monitor type person or security officer to come by and just say I wanted to see how you were...

A: No interface at all.

Q: You don't remember any strangers poking around or....

A: No, just absolutely nothing. We were just a little bunch of civilians there on an almost deserted base, doing what we wanted.

Q: Going back to the orders that you mentioned, were these some sort of special orders different from what we would typically see as military orders?

A: You'll have to talk to Trakowski on it, but my opinion is that he had orders that came from a fairly high level that introduced him and let him do what he wanted to. As the research changed, he didn't have to go back and get new orders. He was in the position of doing what Crary and Peoples wanted.

Q: Like Jim and I have blanket orders that say we're authorized to go anywhere, essentially, in the world; but was there anything specific in those orders that said provide all assistance requested...

A: I suspect so. I too, have had such general orders -- do as someone may deem necessary. In fact I have a copy of my

1944 orders that say such things here. But you'll have to talk to Trakowski. My feeling is that he and Peoples provided the interface to the base and we just weren't bothered. We never saw anybody in security. There was certainly nobody keeping us secure. If anything, we were keeping ourselves secure.

Q: These are the pictures taken in General Ramey's office, 8th Air Force Headquarters by a news photographer of the Fort Worth Star Telegram. It's four pictures that show various people with some equipment, and I'd just like to know what you believe that equipment tc be.

A: Joe Fletcher has written your friend Todd, and said there's no question that's a target. The only question is that there are people who allege this is a target that's been substituted for the real debris, and there are also stories where Marchelle said the picture in which he appears are the real stuff, etc. That looks very much like our radar targets. And you'll notice that this does look more aluminum foilish than what I have here. It's my memory that there was good, bright, aluminum metal foil, not painted stuff on the targets we were using. That looks like more than one target to me in the various pictures. That looks like the stuff we were flying.

Q: I think they talked in terms of being a rawin target in this book.

A: It's just radio wind. There are two kinds of radio winds -- the 400 megacycle transmitters tracked by the SCR-658, the old bed springs; and then the radar wind. Ray Win is the right way to say it.

Q: So the rawin would be a radar target that most of the officers and the weather people there would have been associated with, they would have some knowledge of?

A: Not really. . .As I say, these came out right at the end of the war. The warrant officer, I have a letter that he wrote Todd, I don't know if you've seen it...

(Pause)

Q: We've got this thing narrowed down to just a few flights. There couldn't have been... Due to your time frame, when you were there, the rancher went on the record of saying he picked it up the 14th or the 15th.

A: The 14th.

Q: So it would have to be in the June field trip, early in June. You had several service flights but you also had, you called them experimental flights. The experimental flights with the testing...

A: The ones in early June were all service flights. In other words, all flights we were making for Peoples, and we had some radar test flights.

Q: So to go with the June 14th date, what type of flight do you think would have...

A: All the balloons launched in that period would have been meteorological balloons, 350 gram meteorological balloons, some of them with radar targets just to test the radar out and some of them, I'd forgotten all about it, but Crary's diary says we had sonobuoy microphones on some of them. So that black box that Cavitt had really began to get my attention.

Q: That would not be a radiosonde.

A: That would not be a radiosonde.

Q: What would a radiosonde look like?

A: It would be a white, usually a cardboard or a plastic box, and the fact that we were involved in radar is because we weren't allowed to have our radiosonde equipment. We weren't all set up for that.

Q: You said you didn't bring it with you.

A: We didn't bring the receiver. I have to correct myself, we did attach radiosondes to them, to the flights carrying microphones because there's a statement in this summary here of radiosonde reception. Radiosonde recording. So I take that back. Yes, we had radiosonde. But we did fly this one mentioned here, on June 4th, out to Tulerosa range, no balloon flight, again, on account of clouds. By that he means none of their flights. Then "Flew regular sonobuoy mike on a cluster of balloons and had good (inaudible) receiver on ground but poor on plane."

Q: I notice early on you were going ahead with the Navy stocked sonobuoy while Professor Ewing was trying to perfect his technique of the low range frequency microphone.

A: Oh, the low frequency microphone, right. That's correct.

Q: He was experimenting with both AM and FM, is that your recollection?

A: In the laboratory, devices for measuring low frequency acoustic waves were well known, but what he was attempting to do was to modify these and devise something to be a throw-away microphone and radio transmitter, so this was to build an instrument for a certain purpose. He actually had a fellow named

Joe Johnston, the electrical engineer at Columbia, whose name will come up as the person who did these.

Q: But you think in these early service flights you did have sonobouys?

A: Initially we had sonobouy, according to Crary. We initially were flying radar targets on the balloons only. Then by about Flight 5, we'd had sufficient lack of results that we began putting radiosondes on.

(Pause)

Q: The end report we're going to write is going to be based on official records, and essentially, transcripts such as this. So there will be a lot of things, Cavitt's tape, the transcript will not be part of that. This statement will be.

A: If you remember, there's a note in there from Dave Atlas to Colonel Duffy, a copy of a letter. Dave mentioned somewhere or another that Colonel Duffy took him down in the basement and Colonel Duffy had trunkfulls of documents that were unclassified. I wonder if it would be possible for you to contact Mrs. Duffy...

Q: I was wondering about what she might have.

A: She may have a great deal. Maybe in the Duffy file I have the address and phone number. I think it's Barrington, Rhode Island.

(Looking for name and phone number)

A: Here's a letter Todd got having to do with chasing down modern targets, the people who now make targets, who know nothing about this earlier affair.

Q: We talked with the Signal Corps up at Fort Monmouth and that's where we got the copy of the engineering drawing, which is a copy for you. They said these targets are no longer made. They have a national stock number and they can be made, but they would have to go out and write a new contract for them.

A: This is the C Model. It doesn't show the reinforcements.

Q: The young lady I talked with at Fort Monmouth indicated this drawing pre-dated that time frame. June of '44.

A: I'll be darned.

Q: I found that unusual when she said that was June of '44, and I didn't pick up on the designation being printed on the

side. I thought the B Model was a 1947 vintage and assumed, wrongly so, that the C Model would have come later.

A: This, then, is really... So they didn't change the numbers. It does show the little swivel there, in '44. Well, as always, my memory can be improved.

Tibbetts, the radar lieutenant working for Fletcher, said that when they got these in '44 there was a lot of trouble with breakage in the air and they had to go back for reinforcement.

Q: That's where maybe the tape came in?

A: He said that's where the tape came in. Because it certainly doesn't show this. There's just no question in my memory, bad as it may be, that there was a tape there. That impelled me to drag out Herbert Crow's letter. While I'm finding that, here is a communication between Todd and a Warrant Officer Newton, who identified things in General Ramey's office.

(Pause)

Q: It says a material like mylar. Do you have any knowledge of when that term came into use? mylar is a polyethylene, it's a metalized polyethylene.

A: It's not really a polyethylene, it's a polyturpoline...

Q: I'm not a chemist.

A: It's really quite a different thing. We certainly got involved with mylar balloons in General Mills around 1950 or 1951.

Q: Nothing that early, though.

A: I think not. It was really quite a new plastic. This is mylar. As you can see from the appearance, it's really quite different than polyethylene. It's non-extensible, where this really stretches. This scatters light and this doesn't. We have flown mylar balloons and mylar balloons vacuum coated with aluminum, but I think we didn't fly any in this era. It would be my guess that someone is sort of confusing this with later things. There were a lot of mylar balloons carried on rockets, and it was called Jim's sphere. Someone named Jim came up with the idea of increasing the turbulence around a following sphere by putting a little protuberance, little combs out on it. That was Jim's sphere. A lot of them were flown to measure winds in the low ionosphere, flown on rockets, from White Sands. They could well have fallen, but to my memory, it would have been anachronistic, out of times.

Here's a letter to me from Herbert Crow who was one of my technicians in the 1948 operation. These pictures you saw,

including that debris, are pictures that he sent to me with that letter and a subsequent letter. These are pictures taken by Crow.

Q: When did Alamagordo become Holloman?

A: Probably about September of '47.

Q: It says HAFB on the back of the truck.

A: Those pictures were taken during the Sandstone operation in April of '48.

Q: I take it the side arm was for protection against rattle snakes?

A: Good question.

Q: Some of the popular writers have alleged that certain persons were turned away by armed guards, etc.

A: Not in our area.

Q: I mean as far as the so-called...

A: Oh, out at the ranch.

(END)