



Hands Across History



A joint newsletter for the White Sands Historical Foundation and the White Sands Pioneer Group.

Volume X, Letter I

February 2014

White Sands Loses Three Former Leaders

On January 11, **Maj. Gen. Niles Fulwyler**, 85, died in his home state of Idaho. Fulwyler was the 16th WSMR commander, serving from 1982 to 1986. He retired from White Sands was then inducted into the Range's hall of fame in 1996.

Fulwyler was a commander who took special interest in the missile range and its past. After his first tour at White Sands, he asked for a second round and got it.

When he saw the condition of the Schmidt/McDonald ranch house at Trinity Site, he personally took on the task of getting it restored. He was able to liberate a quarter of a million dollars from the Dept. of Army and the Dept. of Energy to fund the restoration project that was done by the National Park Service.



Fulwyler also embraced the Park Service's designation of Launch Complex 33 as a National Historic Landmark. Earlier commanders had shunned Park Service advances to have LC-33 and Trinity Site designated as landmarks. Fulwyler understood their value and did not share staff fears that the Park Service would take over the missile range.

When the missile range started its museum, Fulwyler was an early supporter. Then when the White Sands Historical Foundation was created to assist the museum, he was active in many of its functions. In fact, when he died he was an advisor to the Foundation's board of directors.

When word of his death reached New Mexico, the Foundation immediately set up a memorial fund so people can donate to the museum in the general's name. So far, the following folks have given something to commemorate Fulwyler's legacy: Doyle & Lutisha Piland, Carolyn Dye, TRAX International, Gloria Wellman, Jon & Elvia Gibson, Frances Williams, Jim Eckles, Gwendolyn & Charles Revie, and James Fletcher.

On January 24, **Dr. Richard Duncan**, 91, died in Las Cruces. While at New Mexico State University as a physics professor and vice president for research he advised on several missile programs at White Sands.

In 1969, he was hired as the Range's technical director

and chief scientist, a position that had been vacant for years. Duncan then retired from White Sands in 1986. As chief scientist, he has overview of all the technical operations at the sprawling missile range.

On January 31, **Rear Adm. Paul Arthur**, 83, died in Las Cruces. Arthur almost spent a lifetime at White Sands with nearly 50 years at the missile range. Also, he was active in the White Sands Pioneer Group and served as its president, 1989-90.

Arthur came to WSMR in 1956 at an electronics engineer in the Missile Flight Safety Office. Most of his time was spent in a variety of positions in the Material Test Directorate.



Eventually he rose through the ranks and became the organization's director. Then he moved on to become the deputy commander and executive director of the White Sands Test Center. Finally, he was made WSMR technical director and deputy to the commanding general. He retired from that position in 2004.

In 2005, he was inducted into the missile range's Hall of Fame along with his wife Joy.

Foundation Golf Tourney To Raise Money For Museum

The White Sands Missile Range Historical Foundation will sponsor a golf tournament to raise funds for the WSMR Museum on May 16 at the Range's golf course. The 4-man scramble format has an entry fee of \$60 per person and includes green fee, cart and lunch.

Check-in at the event is from 8 to 8:45 a.m. with a 9 a.m. shotgun start.

Doug Messer has volunteered to be the point of contact again. His phone number is 575-430-1825 and his email address is: dmesser99@aol.com.

Donations are being accepted in the form of hole sponsorships and prizes to be given to participants. Contact Doug if you are interested in helping out without actually playing.

A Tribute And Farewell For An Old Soldier

By Frances Williams

Major General Niles J. Fulwyler was a man for all seasons. Erudite, kind, decent, a man of strong faith and one who cared deeply about the people he led.

When he came to White Sands Missile Range as the commanding general, he let it be known immediately that he had an open-door policy. When I briefed him on both the military and civilian equal employment programs, his questions to me reflected his concerns about the welfare of his troops and civilians. There were many meetings with him in which very contentious and difficult issues were discussed and argued relating to the workplace environment. A lot covered ground that had never been plowed before and required Solomonic wisdom.

I was usually on one side of the issue and another manager on the other side. He always listened thoughtfully and respectfully giving both sides equal air time and then made his decision. These were very often difficult decisions because they dealt with perceptions, emotions and doing the right thing.

The general believed in doing the right thing. And, although I didn't always agree with some of his decisions, he was the Commander, my boss. I saluted and said, "yes sir."

When he knew that I was in disagreement he would call me to make sure that I understood why he came to his conclusions. I appreciated his thoughtfulness and his concern, which I saw manifested in so many other ways.

I taught him how to say "women" instead of "girls", and he always made sure that if he said "girls" when I was present at a meeting or conference he quickly corrected himself. He was not a good loser though. I remember beating him at a poker game, which he did not take gracefully. He demanded a replay the next day, in which he won all his money back.

Christmas at his quarters was a delight because he dressed in a red and green plaid jacket and had a table runner to match. He was a gourmet cook and truly enjoyed a glass of wine.

Under his leadership great strides were made in the Equal Employment Program, because he recognized that diversity and fairness strengthened our workforce and were the hallmark of what America stood for - the core of our ideology.

Yes, General Fulwyler you will be missed but remembered for the positive impact you made on so many lives and the legacy you left behind.

Paying Homage And Helping Our Museum At The Same Time

By Frances Williams

I think one of the best ways to honor or memorialize the contributions of one of our WSMRites is to make a contribution in that person's name to the White Sands Museum through the historical foundation.

For instance, I am making donations to the foundation in the names of the three leaders who recently died. But I am also making a donation to honor Jim Eckles who was recently inducted into the WSMR Hall of Fame. In addition, Jim's book *Pocketful Of Rockets*, the first history of White Sands, recently went on sale. His book details the history of White Sands and relates many stories of the pioneers who made the missile range what it is today. Also, Jim has been

our corporate history story teller for years and prepares this newsletter. He deserves some recognition.

Not long ago, I made donations in memory of Ida Mae Townley, wife of Ed Townley, and and Gabriel Galos. Ida worked at WSMR for 20 years, most of them spent at the TRADOC Analysis Command, Gabby worked at White Sands from 1952 to 1977. He was a pioneer in a number of research and development projects and was inducted into the WSMR Hall of Fame in 1985.

You too can make a donation to honor someone who has died or had a special anniversary or accomplished some great deed by sending the pertinent information and a check to the address below. Every dollar makes our museum better.

Statement of Purpose and Membership

The "Hands Across History" newsletter is published by the White Sands Missile Range Historical Foundation and the White Sands Pioneer Group (WSPG). Both nonprofit organizations aim to preserve the accomplishments of White Sands Missile Range.

The newsletter is intended to keep members of both groups informed about current events and share information of common interest. The edi-

tor is Jim Eckles. He can be contacted by email at nebraska1950@comcast.net or at either address below.

Membership to either organization is open to anyone who shares their goals. However, details of membership (dues, etc.) differ between the two groups. For more information, please contact the appropriate organization and we will send it via the Post Office or email.

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White Sands, N.M. 88002

White Sands Historical Foundation
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Why We Built That Huge Billboard On The The Mountain West Of Post

By Jim Address

This is another one of my articles on WSMR's commo history. In this piece I answer questions about the big billboard structure that was once up on the mountainside in back of the golf course - what was it? - why was it there? - what did it do?

Yes, it did look like a big billboard, but in reality it was a reflector for radio communication signals. Back in the 1960s there was a lot of innovation being done in instrumentation hardware and techniques. The same can be said for long-haul microwave radio communications.

We typically think of microwave radio as a point-to-point facility using a radio beam directed and focused between two parabolic, or dish shaped, antennas. Just like a beam of light transmitted from a flashlight, the parabolic reflector in back of and around the small light bulb, reflects the light energy into a beam and directs it to wherever you point it. Also, if the beam of light from your flashlight strikes a hard flat surface, particularly shiny metal, it is reflected, or

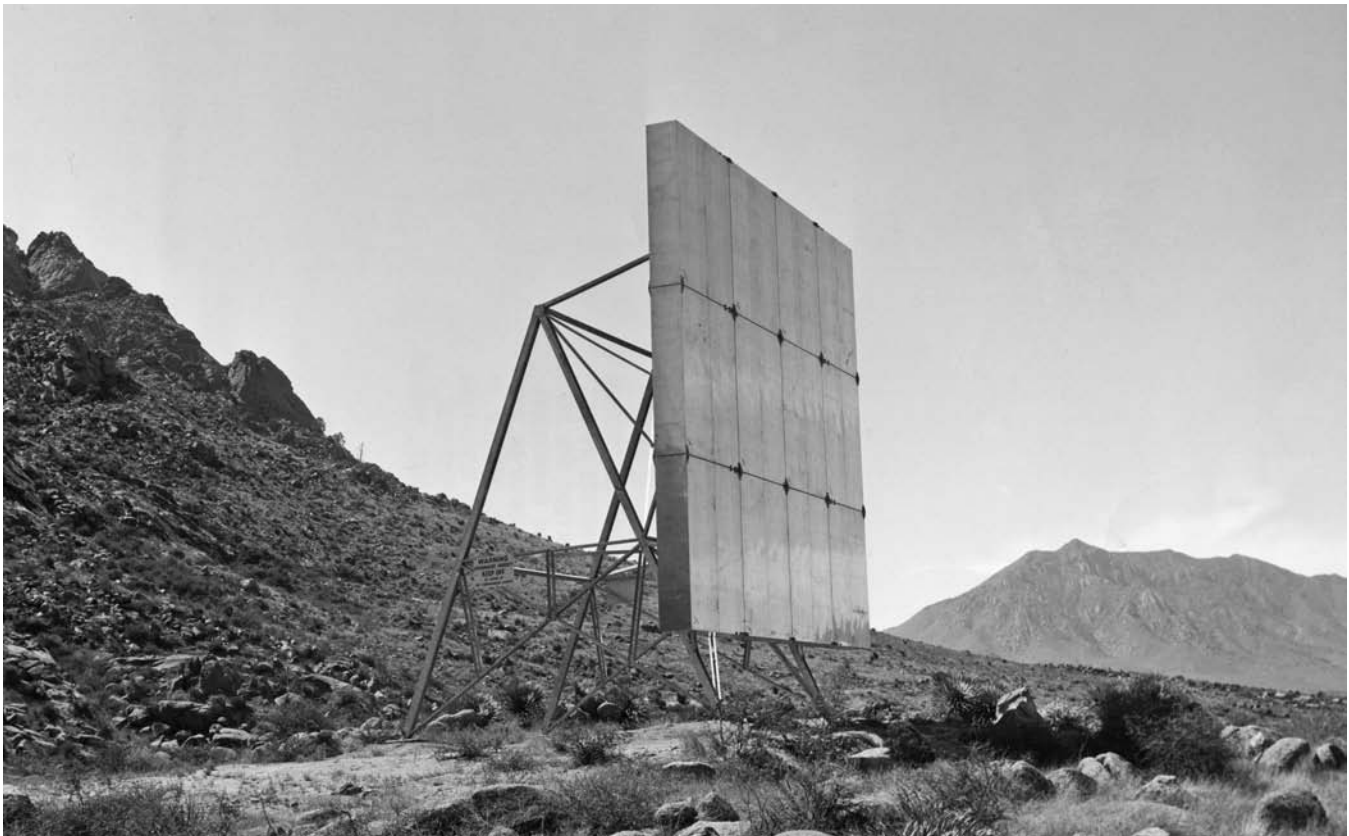
It was early in 1962 when the late Ben Billups, Director of National Range Data Reduction, contacted WSMR communications. He needed a broadband communications link for real-time, post-mission and related telemetry data transfer between the Land-Air data center in Bldg. 841 and Bldg. 1512. We had three options:

1) Put a radio repeater in the Sacramento Mountains. Establishing another off-range operation, security issues, and other logistic problems ruled against this idea.

2) Erect a 200-plus-foot tower in the tech area close to Bldg. 1512. With very little study, this was quickly determined to be administratively and appearance-wise unacceptable.

3) Place a reflective passive repeater in the mountains in back of the golf course.

All things considered, the passive repeater, or billboard, was the best option. In those days, the broadband fiber optic cable media that we take for granted today, had not yet been developed.



redirected in another direction. Its Geometry 101.

In the case of the billboard, we were doing just that, reflecting a broadband high-data-rate telemetry radio relay signal between Bldg. 1512 on the WSMR main post and old Bldg. 841 at Holloman.

Since this was a specialized system for a special customer, we contracted with Rockwell/Collins. They had been in the microwave business for many years, were familiar

see A Real Team Effort, page 6

How We Solved The Turbulence Problem

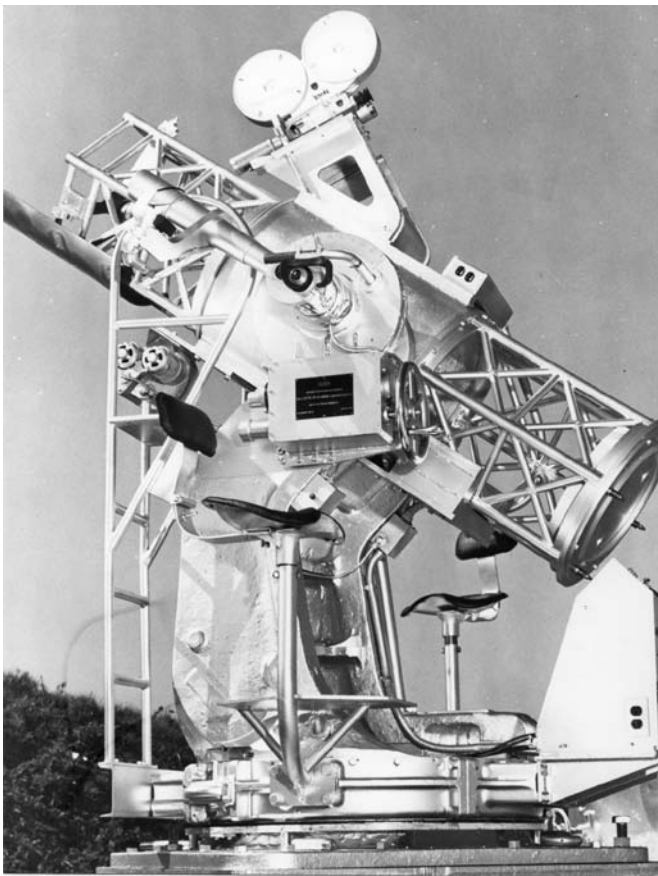
By Bruce Kennedy

The IGOR, short for Intercept Ground Optical Recorder, was one of several types of tracking telescopes used at the White Sands Proving Ground in the early days of missile testing. It was designed by the Army Ballistic Research Laboratory in Maryland and consisted of a modified 5-inch Navy gun mount outfitted with a 16-inch diameter, 96-inch focal length Newtonian optical system and a 35 millimeter Mitchell motion picture camera.

Tracking of a missile in flight was accomplished with two operators, one cranking an azimuth wheel and the other cranking the elevation wheel. It took practice to get the hang of keeping the speeding missile in the operator's telescopes.

There were six or seven IGORs operating in the southern 30 miles of the range. There were additional IGORs and other long focal length tracking telescopes in the north range. The south range optical systems were operated by civil service personnel, while the north range systems were manned by contractor personnel.

Overall, there were three types of optical systems in the south range: tracking telescopes to record missile attitude, pitch, yaw, roll rate, events, intercepts, and miss distance; cinetheodolites to record missile position; and fixed cameras to record launch events. There were several other types of tracking telescopes besides the IGOR. These were



An Intercept Ground Optical Recorder - IGOR. Placed into service circa 1951.

mobile telescopes that could move from site to site depending on the project requirements. The telescopes consisting of a 24-inch and 48-inch focal lengths were mounted on a modified M45 machine gun mount and operated by one man. A Mitchell camera was also used on these telescopes, but sometimes a project would require a faster frame rate and Fastax cameras were used. Mitchell's ran at a rate of up to 60 frames per second, while a Fastax could run at 2500 frames per second. These cameras were typically used to record events such as drone intercepts and they would easily use up 1000 feet of film in five or six seconds.

In the early 1960s, some 70-millimeter cameras were purchased to provide a wider field of view. Early models ran at up to 60 frames per second and later versions operated at 300 frames per second. Both color and black and white film were used depending on project requirements.

Up until about 1962, Eastman Kodak's 35mm linograph shell burst film was used because of its high contrast characteristics. The emulsion was on an acetate base which worked nicely in warm weather. However, in cold weather the film grew brittle and it frequently broke running through the cameras.

This problem was solved when DuPont developed a mylar film base that was virtually unbreakable. Their emulsion didn't have the high contrast but was acceptable for the range's use. DuPont didn't have a color emulsion, so the Kodak color film was used for special project requirements.

Operating long focal length optics in a desert environment presented some unusual challenges. Keeping the optics clean was always an issue in the dusty atmosphere. A much more severe problem was the operator's ability to focus the camera on the subject for long distance tracking of a missile in flight. Using the IGOR as an example, the typical method of focusing was by parallax, where the operator would move



Operators also found they could reach out and shoot a few frames of other subjects. The photo above of the big buck was photographed using an IGOR at Nancy Site. The IGOR photo below is of Saturn. Photos courtesy the author



see Heat Waves, page 5

Heat Waves

CONTINUED FROM PAGE 4

his head from side to side while looking at the camera reticle. When the object he was focusing on remained stationary in the reticle, the focus was good.

The hyper focal distance for the 96-inch Newtonian telescope was 12 miles. Focusing at 12 miles would give the image on film acceptable quality of focus from 6 miles to infinity. However, atmospheric turbulence, heat waves climbing vertically from the ground, produced a fuzzy image on the focusing reticle. In other words, the operator could not rely on image quality for a good focus.

The parallax method was equally challenging. Turbulence virtually made the parallax method useless.

James Lofland and I were systems engineers working in the tracking telescope section at White Sands Missile Range in the early 1960s. James had purchased a Nikon 35mm camera that had an unusual focusing reticle. In addition to the ground glass, it had crossed prisms in the center of the reticle. This allowed the camera lens to be focused with greater accuracy.

For instance, while looking at a vertical object such as a telephone pole, the image was split when out of focus. As the lens was rotated for focus, the pole would come together. When the two halves met, the camera was focused.

We asked, "Why wouldn't the split image technique work on the long focal length optics we were using to track missiles?" Fortunately, our optics division had a terrific opti-

cal laboratory and a talented optical technician named Dave Watkins. We drew up a diagram of what we needed, which consisted of two crossed prisms ground and polished at 15 degree angles and mounted on a Mitchell camera reticle. He made about five or six reticles, we mounted them in cameras and then we asked the operators to evaluate them in the field.

The results were so good that when the operators brought their cameras in for maintenance they would ask the camera shop to make sure they got the new split image reticles. So, the concept of the split image focusing reticle was accepted by the men who had to use new devices.

However, there was still some turbulence interference. We realized that the longer the focusing distance the more turbulence was encountered. The shorter the focusing distance, the smaller the turbulence effect.

To test the split image reticle, we erected a special focusing target a few hundred feet from an IGOR and accurately measured the distance. We then focused on the target board with the split image reticle and then applied an

optical equation to determine the necessary camera adjustment for an infinity focus. A depth micrometer was used to precisely move the camera the correct distance.

The results were phenomenal. The technique using a split image reticle and focusing target was so successful that it was used on every camera and telescope at all south and north range tracking locations.



Bruce Kennedy, left, explains the mobile tracking system to Mr. Streetmatter, a representative of the Eastman Kodak Company, circa 1962. Photo courtesy the author.

White Sands Hall Of Fame Nominations Due By March 31

White Sands is now accepting nominations from all sources until the end of March for its hall of fame.

The hall of fame was established in 1980 to honor former missile range personnel who made lasting contributions of an outstanding nature. Past honorees include such individuals as Wernher von Braun, the famous German rocket scientist, and Dr. Clyde Tombaugh, the astronomer who discovered Pluto. Recent inductees are Andy Portillo and Jim Eckles. There are now 50 individuals in the White Sands Hall of Fame.

For information on nomination procedures or to request a copy of the White Sands Hall of Fame Guide, call the WSMR Office of the Chief of Staff, 575-678-5398.

The guide contains the forms, guidelines and procedures for nomination.

To get into the hall of fame a nominee must have been responsible for significant and lasting deeds or achievements in support of the missile range mission. The contributions may be in various areas such as research, cost savings, technological advances, safety, public relations, equal opportunity or heroic deeds.

All former military, civilian and contractor personnel who once served at White Sands are eligible for nomination. No one currently working at the range is eligible.

NOTE: The editor can email you an electronic version (Word document) of the Hall of Fame pamphlet/guide.

A Real Team Effort

CONTINUED FROM PAGE 3

with military telemetry system formats and techniques, as well as billboard technology.

So, a team was made up of WSMR commo engineers as project managers and Rockwell as the system engineering and integration contractor. Another vital member of the team was the WSMR Post Engineers.

Having the engineers on board was a good move. Their construction people already had security clearances, they had the construction equipment, and they had the skilled people with experience in building roads and precision structures. Plus, they were local, on post, and available with flexible schedules, all of which contributed to significant cost savings.

Initially, the construction effort required us to open an old mining site trail so material trucks and the erection crane could get to the site. One interesting individual on the job was the crane operator. He was an elderly gentleman who, as it soon became obvious, had many years of experience with cranes. He gently maneuvered his large crane up the difficult road, got it into place, and very carefully hoisted the precision components into place. This was especially important when it came to the big 4x10-foot reflector panels. If the construction personnel wanted a structural member or panel moved half an inch, he moved it exactly half an inch, any direction, up or down, very smooth with no swinging. It was a pleasure watching a real pro work.

As you can see on the page 3 photo, the mechanical construction of the billboard's reflecting surface consisted of twelve 4x10-foot panels. It was 30x32 feet when assembled,

for an area of 960 square feet. This largish area was necessary in order to achieve the required approximate 115 db of reflective radio frequency gain for the propagation path. We were able to achieve this minimal size due to the very small reflection angle of the radio path, less than 10 degrees as I recall.

One other interesting engineering number - since we were using radio frequencies in the 7000 mhz frequency band, this required that the face flatness across the 960-square-foot area be no more than plus or minus an eighth of an inch. This figure is one of the reasons that the construction effort had to be very precise.

Being a technical issue for the Range instrumentation support, it was relatively easy to get master planning board approval for the project. However, after the board was installed, there was occasional criticism from the garden club and others who liked to look at the mountain scenery. It was understandable. Without question, the board certainly was not visually or environmentally attractive. I had to address this issue occasionally over the years. The most common requests were to move it and/or paint it. Moving it would have just made it useless and painting would have caused a constant maintenance issue, plus potential distortion to the flatness requirement.

Interestingly, under certain weather conditions, the board was essentially invisible from the main post. But under other conditions, it was highly visible and reflective. It stayed put until the mid 1980s, when communications requirements changed, and it was removed.



What is left of the huge metal billboard today. The trail to Texas Canyon passes by the frame. Photo by Jim Eckles.

**WITH GREAT APPRECIATION THE
WHITE SANDS MISSILE RANGE HISTORICAL FOUNDATION
ACKNOWLEDGES THE GENEROSITY AND SUPPORT FROM THE MANY BENEFACTORS
TO ITS CAPITAL FUND FOR THE
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**October 1963 photo of Shillelagh project
personnel from Lawrence McFall.**

Left to Right, Front to Rear:
SP/4 Weimer, SP/4 Kuranaka, SP/5 Miles, PFC David L. Smith, Mrs. Price, SP/4 Harry G. Mumpower, PFC Gary Henry, SP/4 J.J. Johnson, SP/4 Nugent, SP/4 Harold Dameron, SP/4 J.O. Smith, PFC F.L. McFall, SP/4 C.K. Hardison, SP/5 Nomura, SP/5 K.G. Brooks, SP/4 Taylor, SP/5 Michael Garcia, Mr. A.L. Williams, Capt. Warren J. Warren, SFC Rowe, SFC Ringwood, Sgt. Dennis Ball, Mr. R.E. Masters, Mr. Darryl Newcom, 1st/Lt. Teele, Capt. Daniel Duggan