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Mr. Secretary, Gentlemen:

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It is my privilege to participate in this morning's briefing. My subject will concern the Atomic Energy Commission's nuclear testing effort with particular emphasis on testing conducted at the Nevada Test Site and its proposed test locations at Central Nevada and Amchitka in Alaska. 407981

First, let's take a look at the general areas which have been used for nuclear testing. Although we have been preparing for tests - tests have been conducted at the Eniwetok Proving Ground, Bikini, Johnston Atoll, Christmas Island and the Nevada Test Site. Eniwetok, Bikini and Christmas Island are now, of course, denied to us for political reasons. Tests not connected with weapon test program have been executed in New Mexico, the northern part of Nevada and one test is now in process of being readied in Colorado.

A lot of locations are in support of the Plowshare Program. This chart summarizes the number of tests conducted since 1946 at the several locations. The total number of events as of August 25, 1969 was 361. The split between atmospheric tests and underground executions is shown here. You will note from that chart the gradual escalation in yield. The early days of one of about 22 kt to our targets now in the 1mt range. One of them was Faultless

[redacted] detonated at Central Nevada test site - we'll look at that later. NVOO's nuclear weapon testing program supports two of the four safeguards - first, maintaining an aggressive underground nuclear test program and the second the maintenance of facilities in the Pacific for the resumption of atmospheric testing, should it be authorized. The other two safeguards relating to the maintenance of the modern nuclear laboratory facilities and the improvement of our capability to detect Soviet violations

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is primarily the responsibility of the laboratories, although NV00 has supported this effort.

Next, let's take a quick look at the organizations primarily responsible for test planning and the safe conduct of nuclear weapons tests. Programmatic direction is provided the Nevada Operations Office by the Assistant General Manager for Military Application, this is General Giller. This guidance is implemented by the Los Alamos Scientific Laboratory, Lawrence Radiation Laboratory and Sandia Laboratory. The Nevada Operations Office provides the logistical, operations and safety support to these programs. The technical program is diagnostics and the requirements to support the program is the responsibility of the laboratories. NV00 satisfies these requirements within the limits of policies established by our Headquarters, Standard Operating Procedures, and the funding limitation, of course, imposed by higher authority. We'll discuss operational safety later.

The current testing areas, of course, primarily involved is the Nevada Test Site. This is a schematic of the Nevada Test Site. It consist of about 1500 square miles of real estate and is divided into operating areas for nuclear testing, logistical support area, and the nuclear reactor development test station. The green area consisting of about 700 square miles is where most of the underground testing is conducted. The red area to the right is Pahute Mesa where tests of about 1 mt have been conducted and where somewhat higher tests are planned for next calendar year. The blue area is not suitable for normal underground tests but has been used for cratering experiments in hard rock. This has been primarily in support of the Plowshare Program or the Isthmian Canal studies. Mercury, at the extreme

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left is about 65 miles from Las Vegas, and Pahute Mesa is about 60 miles to the north of Mercury. This is an aerial view of the NTS looking north into Frenchman and Yucca Flats. The first tests were conducted here in 1951 as part of the Ranger Series. It has been the site of over 350 tests, including three tests for the United Kingdom and Plowshare device development tests as well as the first major cratering event of about 100 kt. Facilities supporting the test program of a capital value of about \$200 million. Its geology and hydrology have prove exceptionally suitable although originally the site was picked for atmospheric test purposes. Approximately 10,000 people are employed here and its operating contractor is the largest single employer in the State. Yucca Flats, about 10 x 20 miles in size, north of the Control Point is the primary firing area for events of less than 500 kt. In 1963 an agreement was reached with the Air Force to add about 103,000 acres where deep hole construction was possible. This would afford us the capability of emplacing device in depths up to 5,000 feet with drilled diameters of up to 120 inches. This upper yield limit at Pahute has not been established, although one may speculate that it probably approximates 1.5 mt. This is a typical emplacement facility. It's probably not completely accurate for any event that has ever been fired at the Test Site. Each event, of course, is carefully designed for containment and the diagnostic information that is required. You will note the depth - the canister being at the bottom with various materials being emplaced from a coarse backfill interlayered with fine backfill and finally a grout fill at the top and, of course, a cap. The rule of success in the containment of underground nuclear explosions really comes out of the (effort) to get a (representative) picture of containment. We have looked at a 171 tests performed from August 5, 1963, when the Limited Test Ban Treaty was signed, to March 1, 1969. This number includes all

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nuclear tests except those which were fired for cratering purposes. These tests which were examined in depth were fired in vertical drilled holes, some in drilled hole horizontal tunnels - which we'll take a look at a later. By far the greatest number of tests have been fired in these vertical holes without pipes or other direct communications with the surface and stemmed with sand, gravel, and cement just above the test device to the ground surface. Considering all the tests in this general category and size, since the resumption of nuclear testing in 1961, only ten released radioactivity of any consequence. Of these only three released radioactivity that could be detected outside the controlled area of the Test Site. Of these ten, (300 ground fissures) commencing within a few minutes of the explosion, the other seven seeped radioactivity after cavity collapsed. Of the ten, seven were tests with yields of less than 5 kt. We have never experienced a venting in the upper or higher yield range. To give you some comparison, we also support the Department of Defense, particularly DASA, in its effects experiments. This illustrates a tunnel configuration involving a line of sight canister for the Minute Gun Series. I think it is very clear the extreme complexity of this type of event.

During the fall and winter of 1965, a great deal of thought was being given to site locations where higher yields would be acceptable. During the winter of 1966, several possible supplemental test areas were examined and evaluated. We looked very carefully at the geology and logistical characteristics and safety problems upon the proximity of the human population centers. As a result of this investigation, three sites were selected for further

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exploration and study. The first of these, indicated by the star, was the Central Nevada Test Site located about 90 miles north of the present Nevada Test Site. Our studies at that time appeared to have suitable ground water and geologic characteristics. It had no significant logistical problems. Because of the area's proximity to Salt Lake City, which is about 250 miles, also about the same distance to Las Vegas, it was felt that this site may not be adequate for the very highest yield which we may be required to execute.

The next site is the Island of Anchitka, located 1400 miles to the nearest largest population center, Anchorage, about 200 miles to the nearest permanent settlement, that is Adak. Studies show apparently quite suitable geological and ground water characteristics. Let's take a look at this site. The Island is about 35 miles long and we undertook an investigation of several drilled sites. Our original plan was to be able to fire at one end of the Island with the Control Point located at the extreme end of the Island. For example, it might be possible to locate the CP near the warehouse and base camp area and fire at drill Site H and finally at the conclusion of the series we might locate our Control Point at the northwest camp and actually emplace at drill Site A which probably have a severe effect on support construction. Noting the map, it's very clear that we have explored the Island to depth and in particular with each emplacement hole that has been an exploratory hole to define very carefully for us the geology and hydrology. Our third alternative under conditions, were locations like Australia, Christmas Island were denied to us, was the North Slope of the Brooks Range and the northern part of Alaska located about where my finger is. We _____ this area on two different occasions and

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actually came up with a preliminary design as to how we might support this test. We have looked at this concept again and to replace the current program we would probably require some two years and about an additional \$300 million to place us in the same operating situation as we now find ourselves in preparation for Milrow.

Let's come back and take another look at the Island of Amchitka.

Executive Order 1733 which was issued in 1913 to reserve the Aleutian Islands for Fish & Wildlife purposes provides for the establishment of this reservation, however, we shall not interfere with the use of this Island for (light) houses, military or naval purposes. However, because Amchitka has in its (power) to the national wildlife refuge, we have undertaken very special activities and initiated many studies to protect the ecology of the Island and nearby waters. We have spent more than \$3 million in the past 2-1/2 years in identifying the possible ecological effects of AEC activity on the Island and in devising means of measuring and minimizing these effects. The first test, Project Milrow, will be in the yield range of the larger tests conducted at the Nevada Test Site - I'll discuss this yield problem in a minute, but it will be in the range of about 1 mt.

The calibration test will be located 4,000 feet below ground and is tentatively scheduled for the Fall of 1969. Specifically, we are attempting to attain a readiness date of October 1, 1969. The calibration test is to evaluate the effects of larger tests upon ecology of the Island and water surrounding the Island; the possibility of inducing seismic after-shocks of magnitude comparable to or greater than the shot itself.

Another aspect of public safety. The size and depth of (burial) of shot

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Let's take a look at the Milrow chart. We find ourselves now generally at the end of October and we are looking for authority to ship the device along about that date; received executional authority about September date and be in position to execute about the October date. Going into more detail, as time permits, regarding the necessity for early approvals.

Now let's take a look at operational safety. This is somewhat a bureaucratic approach to the problem, but I think it clearly illustrates the review process.

First, let's start at the bottom. The effects area are divided into six scientific management centers, either the Geological Survey, the Sandia Laboratory, LASL, LRL, Environmental Sciences or Air Weather Bureau (Air Resources Laboratory), and the Battelle Memorial Institute. Specific effects of the program are assigned to the management center and the number of contractors are assigned to each of the scientific management centers for technical control purposes. An unusual shot, such as Milrow, results in the assignment of a scientific evaluation scientist who brings together the total effects picture. The effects evaluation scientist and its report are reviewed by the scientific management center, by panels of consultants, for example, in the case of Milrow the seismic panel not directly reporting to the Atomic Energy Commission, outside consultants have reviewed the recommendations, the Scientific Advisors review it and based upon this the Manager, Nevada Operations Office is in position to make recommendation to the Assistant General Manager for Military Application. A completely separate review, of course, is made by the Atomic Weapon Safety Advisory Board as to the handling and safety of the nuclear device itself. Once the effects

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evaluation report is considered acceptable and presented, the Test Manager proceeds to develop an operational plan to support that. In addition, the Test Manager has reporting to him a Test Evaluation Panel which very closely examines the containment, characteristics of the design, and safety hazards that are associated therewith. Safety programs designed to assign value effects evaluation scientists are implemented under the control of the Test Manager. Of course, at the Washington level additional technical staff examinations are made and finally a recommendation is made through the General Manager to the Atomic Energy Commission. That is the present situation and a recommendation has been submitted for execution of Project Milrow.

Let's take a look at some of the statistics in the case - while I very carefully look through this, quickly rather. Since 1951 through 1965 you will notice that we have paid claims in the order of \$50,000 - most of these were in the Ranger and Buster Jangle area for claims made during atmospheric tests. The Groom Mine shut down was an operational matter and we did have some unusual experiences of glass breakage in Reno. The first Plowshare shot, Gnome, resulted in no claims being paid, nor for Shoal the shot fired in a higher seismic area in Northern Nevada, nor for Bilby. Our current experience since 1965 we had substantial claims as a result of the Dribble experiment in support of the Department of Defense. This resulted in claims in the amount of \$650,000. It resulted from a _____ situation, ground shock. These claims were architectural damage in nature and we paid them

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promptly and have since been welcomed back with some qualifications for the conduct of additional DOD experiments.

You will note that while the complaint or claims received have been substantial, we very promptly investigate these and only on a Crosstie Series did we actually receive and pay any substantial claim. One was - the greater amount of that was for a private contractor's equipment which was immediately adjacent to the shot point and was damaged. The more recent event in the Bowline Series, in particular the Benham Event, resulted in claims amounting to \$575.00

The last program I will very briefly touch on is maintenance and readiness in the Pacific. We attained an airdrop capability in January 1, 1965. This capability afforded us the opportunity of conducting nuclear testing on a fast response time, like 60 days, using the KC-135 diagnostic flying laboratories supported by DOD. Of course, our efforts, particularly at the Nevada Operations Office, are in support of the Joint Task Force Eight technical programs. In this case, again, is the responsibility of the laboratories.

Recently we have been in process of developing a high altitude capability for the construction of some new facilities and the modification of equipment oriented to high altitude capability with maintaining some capability in the airdrop program. I think that's enough to say on that except that program, of course, is in support of one of the safeguards.

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