

VERBATIM TRANSCRIPT, BOARD MEETING #182, 1000, 12 JUNE 1958

SUBJECT: NIKE-HERCULES TESTS

- Present: Capt. W. T. Jenkins, USN, Chairman
- Mr. J. A. Batley, Alternate Army Member
- Mr. H. M. Roylance, " Navy "
- Col. R. T. Fincke, USAF, Member
- Mr. J. A. Tyler, OCO, D/Army
- Mr. F. Z. Hough, BuOrd, D/Navy
- Col. J. E. Harper, USA, AFSWP
- Lt. Col. R. H. May, USAF, AFSWP Consultant
- Capt. L. E. Darland, USA, AFSWP
- Mr. N. G. Hansen, OCE, D/Army
- Dr. Ralph Ilsley, ASES
- Mr. W. M. Wiesenberg, ASES
- Mr. J. W. Lowell, ASES

Classified by Chairman, DDESB
 SUBJECT TO GENERAL DECLASSIFICATION
 SCHEDULE OF EXECUTIVE ORDER 11652
 AUTOMATICALLY DOWNGRADED AT TWO YEAR
 INTERVALS
 DECLASSIFY ON 31 December 1973

(Representatives at the conference unfamiliar with the test letter were given an opportunity to read it before the conference was officially opened.)

Capt. Jenkins: This special meeting was called at the request of the Alternate Army Member, Mr. Batley, to discuss the various aspects of proposed tests of the Nike Hercules. It's one of these situations where the man with the case is also the Board Member, but that's the way we run things here. I'll turn this over to you Mr. Batley.

Mr. Batley: Thank you Captain. As the Captain mentioned the request for this group to get together was rather on short notice. Some time previously, to give you a bit of history, there was disagreement with regard to the physical location of the Nike underground storage boxes. The disagreement was occasioned by the fact that we have a conversion program at which we would place missiles of the Nike Hercules type in an underground box located at 528 ft. from the boundary. There was doubt that quarters erected at the boundary would sustain an initiated explosion within the box. I will refer to the underground storage structure as a box from now on. Initially the Ordnance Corps indicated that they thought that destructive tests might be unnecessary because the evaluation in the beginning

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to select the distance was predicated on certain special aspects of the case. In spite of the recommendation to the contrary there was a directive to this end, destructive tests would be conducted with Nike-Hercules in order to validate or to show the error of the distance at which houses would be permitted from the box. 528 ft. is an inhabited building distance from the box at which houses might be built depending on how the Government buys this land and what easements are taken. In order to get the test program arranged, the directive indicated that the Office, Chief of Ordnance and Office, Chief of Engineers would collaborate. Immediately upon receiving that communication, such an attempt was made, the advice of the Council of Engineers was sought and given. We had considered it several days before the Engineers met with us. There was in our mind a certain prescribed test of destructive type which would furnish to those not completely familiar with the technical aspects of 100 psi impulse and we had hoped that we would instrument the tests completely so that we would have technical information, scientific information, on which to base conclusions. Not only did the OCE and OCO get together but we arranged a conference at the Aberdeen Proving Ground where we considered in the Ord Corps a good portion of the scientific brains in such tests as these. Mr. Hansen, Mr. Tyler and myself were there, including Aberdeen personnel with the Research Laboratory. The problem was (sketches on blackboard) Here is a structure of reinforced concrete walls and beam structure over the top, from this corner to the boundary the distance was established at 528 ft. The quantity of explosives in each of these missiles is in excess of 4,000 lbs., 600 lbs. in the warhead, and while the designer would be quite critical of my illustration of Nike Hercules, I think it will serve our purpose to say that we have in here, approximately 2300 lbs. of polysulfide propellant and in here something like 3000 lbs. of double base

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propellant. The total explosives quantity in the boxes was estimated to be a total of 25,000 lbs., that was arrived at by combining 600 lbs. of the warhead, a contribution which was determined by previous tests at Aberdeen with the polysulfide grains and a 600 lb. warhead primer to be about 12% or 276 lbs. For purposes of computation, we used the total quantity of the double base propellant which added together gives roughly 25,000 lbs. It was to determine whether the missiles when stored in this box and exploded, what type of damage would occur out here. It was previously established in our theorizing on the problem that 600 lb. warheads would probably all be reacted almost instantaneously largely because of fragment reaction. We have specific knowledge that a portion of the propellant grain would react in the order of 276 lbs. each. We believe that some of it react as a result of that 600 lb. initiation. After discussing the ^{with OCE, OCO, & Aberdeen PG} problem/there were many intangibles, there were some areas of uncertainty largely because this is an underground box, it runs from possibly 12" to 6" a slab, it is beam construction, and above it it has a track on which the missiles will be, and in the center will be this elevator to move the missiles from the box to the exterior. The uncertainty was that if it all went up as 25,000 lbs., we would get out in this area something on the order of 1.5 psi. I think we all agree that that does cause some damage to a house. We believe that the damage might not be substantial but how to anticipate what an initiation would do was rather difficult. There is no information available that I know of under this situation, the fact remains however, that we do have the boxes, we do have a mission, and we do want to know that we'll be reasonably safe. After discussing in great detail the tests, it was believed that two possibilities might exist other than all the warheads go up and that is we would get all the warheads to go but at some appreciably small time after these were computed, it was not definitely known

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that an explosion confined in this box momentarily because of the overhead cover that all of the energy released by the warhead might conceivably react later on. Houses out beyond this might be subjected first to a pressure of unknown impulse, and then before its response was completed it might be fowled up by this. These are opinions expressed by individuals that have done much work in this particular field and I think they explained the problem very nicely to us over there. And it left uncertainties. To prove or disprove that the distance is right or wrong it was concluded by the group and we had concluded beforehand, that there is only one means of conveying that information and that is/through this tests of full-scale proportion, largely because there is some doubt as to the accuracy of a scale test and also ~~these that are not scientific~~purely and simply technical information to those that may not be scientifically or technically inclined but rather engaged in broad problems, they might not be able to relate damage and technical information, pictures and movies are very valuable. After the preliminary get-together and the layout of the type of instrumentation that was wanted, it was decided and it was told to the DCS/Logistics that a full scale test was essential. I assure you the instrumentation is as far as we can make it. This test as conceived will provide underground storage structure of the same type of construction that we have in the field. It will not have the utilities of course, nor will it have the electrical installation, but it will have all of the necessary attributes associated with underground structures. It will have ^{within} ~~in~~ it, six missiles less the electronics guidance package, largely because that can be simulated quite readily by radio or other electronic devices of the same magnitude, same size, and same characteristics. The propellant of polysulfide will be in its case and of the same type used in a good missile. It is impossible in conducting a test of this type and magnitude to use questionable

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materials, this has to be a propellant known to be free from fissures, cracks and other things that change its characteristics. The double base boosters of which there is a cluster of four will be precisely the formulation used in the missile. These six missiles it was intended be placed in the structure exactly as it will be placed in the structure in the field. The initial determination that all of the materials would not react was predicated on the fact that we have two banks of three missiles each, each bank being separated from its neighboring bank by about 15 ft. Each missile of each bank of three will probably be 6 ft. one from the other. The distance from the warhead to the polysulfide propellant which we knew beforehand is not inclined to react completely but rather as a percentage reaction high explosiveswise is separated from the warhead 2 or 3 ft. and the double base propellant which is behind it would use it as a buffer and the distance from the warhead back to the double base propellant probably would be 14 ft. We have determined that in the field that an incident developed in that box would be worse if it involved a warhead so far as the explosives nature of the thing is concerned, fire is very serious, but we feel that we should validate the explosives in the warhead and its contribution from the propellant largely because that will give you the blow we most expect. What the contribution of all this is was unknown, but we felt that one missile would be involved. So it was determined in the test program that six live missiles of the type to be used would be placed in the box and one missile of either bank primed in order that there would be an assured high order detonation of that particular warhead. We felt that a single test would not be acceptable because there is no precise information available to predicate the results that we will apparently have. They may all go up, we don't know, we are convinced the warhead will go, we are convinced that 25,000 lbs. will go. The instrumentation will be explained by

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Mr. Tyler, but we feel that the test to prove or disprove the nature and the magnitude of this distance can only be done with a box of proper construction and missiles of that configuration and distribution as in the field and we feel that it's reasonable that only one missile will be involved and probably the warhead. Three tests were considered to be as a minimum. To examine into the destruction that would be produced by such a detonation two houses at each of the cardinal points were considered necessary. One house at each cardinal point would be frame, the other house would be brick construction. The reason that eight houses were selected is that in the question of the test site because of slight irregularities in the terrain out beyond 528 ft., may not be recognized by the people building these things as important. It is important because of reverberation that one might get. We want flat land, but we want the two houses at the far corners to find out if slight irregularities do effect immeasurably the results obtained by instrumentation. The place to conduct the test was quite difficult to select. Aberdeen cannot take a blow of 25,000 repeatedly largely because there are people in the neighborhood and such a large blow in such a populated area would cause repercussions. Yuma Test Station in Nevada was thought an ideal place, but there were reasons against it, because of the lack of instrumentation and lack of personnel. White Sands was finally selected. Instrumentation needed support but it was determined that the test results should be on the basis of the box, the missiles and the houses at the four cardinal points. The reason for that being that we have theorized on what pressures and impulses will do and we have differences of opinion. I think the only thing that will be quite conclusive are photographs of the damage, something that people can handle and see, as well as instrumentation results that will back it up. We propose in evaluating all these tests to run multiple tests. The Engineers collaborated in

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giving us very good estimates and we worked rather closely together. The tests finalized themselves in arriving at a figure of \$400,000 + per test. Probably three tests would aggregate about a million dollars. Individuals in discussing the preliminary tests were convinced that this approach was sound. In our office and in collaboration with the Engineers we prepared a letter including all these estimates, asking that funds be provided and 18 missiles at least be earmarked for these tests. I think there lies the problem, the 18 missiles may never be used if the first test demolishes these houses, I think it's unwise to conduct the other tests. If by chance, however, it won't, there will be two additional tests in order to validate the results obtained in the first one. The request for the missiles was the most important part of the letter/ ^{to DCS/Log} the comment returned indicated that we should take this box and dispense with the missiles first but we would compact in here 25,000 lbs. of high explosives, put a detonator in the ends of the piles and blow it up. Upon receipt of that letter I returned to the source of origin and explained to him the inequalities that are associated with a test of that nature because it would not produce the delays that usually are associated with the travel of a missile from here to here and so on, which as small as it is, is an increment of time. After some discussion it was agreed there that simulated tests using high explosives in place of real missiles was not necessary. However, in the first communication which preceded all this it was indicated that we would discuss it with the ASESB. Our tests had not been completed nor did we know that they would be received and they haven't yet. That was the reason the only thing we could do with the ASESB was send them a communication that we had sent to DCS/Log. After talking with that office, however, they are in agreement that simulation by substitution of high explosives for the warheads and missiles was not entirely

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appropriate. It was indicated, however, that it might be well if the problem as we have proposed it and the test program as we have proposed it be brought to the attention of the ASESB and AFSWP in order to get a reaction of the method of approach and indicate concurrence with the idea that a test to prove or disprove that this distance and its damage to the houses/^{can or}cannot be obtained by the use of the real missile or contrary by use of substitute of HE. You'll all be interested in what we hope to gain from this test in the way of instrumentation, and that is a small part of the problem, because one must get the pressure and the impulse in flows at the distance and far out. It must be in understandable media, something in the order of moving pictures. We also wanted to know what the displacement was in these houses. I'm going to ask Mr. Tyler if he will explain the type of instrumentation that we plan on putting there and what type of information we hope to get.

Mr. Tyler: This chart was prepared by the Engineers...in order that we might save time and money in constructing three different boxes and we have showed around these boxes before houses are constructed around the other here the houses/. What we intend to do is to run one test /.I have sketched in [boxes on one of the boxes the type of instrumentation that is proposed. In addition to the actual photographs of evaluation of damage to the houses it was determined that we would like to know both pressure and impulse caused by this explosion out to 528 ft. distance and carry it on further to 1170 ft. All of our instrumentation is concentrated ^{within} at 1170 ft. radius of the box. There were two types of instrumentation coverage proposed. The first one was camera coverage which it was proposed to use high speed cameras photographing the blast wave against a 1200 ft. fence. These cameras would be located some 3,000 ft. away from the fence line and would be located so that you got a photograph of the wave going in all directions from the box, I've indicated these high speed cameras with a

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little red rectangle so that we have eight high speed cameras, 3,000 frames per second to photograph the travel of the shock wave against the fence. From these kind of records, it is expected that the velocity of the shock as a functional distance from the magazine can be determined and the free air explosive weight from these data. We would also have two/^{fast}cameras focused on the magazine itself, from these records velocity at which debris from the magazine can be determined. We would use eight low speed cameras, 164 or 168 frames a second, to observe the response of the houses themselves from the blast. These locations of course are not exact. We would also have two low speed cameras observing the action at the box. After completion of the test we would have complete field camera coverage of the damage. The blast pressure gage instrumentation would consist of 12 VRL self recording pressure time gages. Eight of these gages would be located in pairs at 1170 ft. from the magazine. The remaining four would be located closer to the magazine for comparison as well as methods of recording, and for the moment I've stuck those in at 528 ft. There will be eight of the second type, four located 1170 ft. from the magazine and two would be brought in to the 528 ft. location. Also we have two at 100 ft. away uninstrumented. Six of the gages would require low frequency response recording equipment. We would either use eight or 16 channels of high frequency response ...depending on what was available at the time. If eight channels are available they would be concentrated at 108 and 528 ft. distance. If 16 channels are available, 1170 ft. distance would also be instrumented. In either case, two reporting channels set at different sensitivities will be used to record the output of the gage. As sort of a bonus from this test we will use four channels consolidated pressure gages and recording equipment to measure the relative long time pressure expected in this personnel shelter just outside the box itself. The ground shock

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section of the ballistics terminal laboratory will completely instrument one frame house. In addition they will install three displacement gages in each of the houses and one ground displacement gage nearby. There will be no ground shock instrumentation available at the time of these tests.

Mr. Batley: It indicates the history and the reasons why the test as proposed appears essential to us. It also indicates the magnitude of the instrumentation that we expect to surround this test with. It is expected to be completed and when completed we will have some basic information on what these missiles will do themselves and what the box will do as a barricaded structure and what blast developed will do to the houses. As I mentioned in closing my previous remarks I have pointed out to the DCS/Logistics the err of substitution in a test of this nature because it will place doubts as to what comes out. I pointed out the essential need and I support that view that nothing but the real missiles will furnish the type of information we want. For it is possible although it's quite improbable that we will have ^{a full} ~~the full~~ missile left in this box after the explosion. But we are fairly confident from previous observations at one other explosion that a double base propellant may not contribute in the sense that it will ^{contribution pound for pound,} detonate full high order/ⁱⁿbut the area of/certainty is that if it is a latent explosion we will find it out largely from the response that we are going to record at these houses. It may at the proper peak extenuate the first blast or it may accentuate it, that's the area of uncertainty and we hope that by these tests, we will for the purpose of using or not using the underground box to determine are we in the ball park or are we out in left field without a glove. The purpose of getting together with you gentlemen this morning was to present to you our reasons for establishing the test program as we did, the reasons why

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we discarded the one that was later proposed by others and to request your review of what our presentation has told you and indicate to us that such a test will provide first, realistic test, realistic results and reliable instrumentation. That's about all I have to say, any questions I will be glad to try and answer them. I think that in view of the communication directed to us where it asks that the opinion of the Board and AFSWP be expressed, I should like to get an expression or opinion along those lines. Maybe Capt. Jenkins would like to read that letter. (Mr. Batley read letter from DCS/Log to OCO)

Capt. Jenkins: I think you said originally that Ordnance had the feeling that no tests were necessary.

Mr. Batley: Yes, there was a communication to that effect, signed by ChofOrd. There was doubt, however

Capt. Jenkins: When there are doubts, tests are in order, the Board, Staff and Ordnance, has doubts, so when you have doubts certain tests are in order.

Mr. Batley: I might say this, that we felt evaluation of what would happen under the circumstances we consider most likely, would be satisfactorily guarded against by the distance at which the box was set. For the quantity of explosives involved, we didn't think tests were necessary, otherwise we would have insisted on tests before. There is doubt that the distance is correct, it is not in my mind.

Capt. Jenkins: Ordnance and Engineers collaborated in setting up these tests, were any other people involved?

Mr. Batley: Two technical offices, BRL and Director of Proof Services who will do the instrumentation were brought in. The chiefs of those groups were in the conference. I might say that based on Aberdeen's opinions as to the validity of test results, it was expressed by the Director of the BRL that simulated missiles with regard to cost would approach very nearly the cost of a real missile taken

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from stock and when we set the basis that we can salvage some of the electronics equipment and not expose it and substitute scrap, the difference in price is not great because a simulated missile in one line will require the precise type of warhead that we have with its fragmentation, the boosters will require the same type of envelope to cover as in the original and the sustainer motor likewise. The bulkheads would have to be put in there in the same manner as the missiles. When one gets looking into the cost of simulation in a test of this nature, it's surprising how fast the price moves up. In addition, the time interval stretches out. Each missile complete is approximately \$80,000. It would cost about \$45,000 to \$50,000 to simulate the same thing.

Capt. Jenkins: I have serious doubts in my mind that a beautiful and elaborate box has to be built instead of digging a hole in the ground. I think you can get close to the same results without putting in that tremendous engineering job in constructing the Nike box.

Mr. Batley: Then after the test is over, isn't it feasible that some people not familiar with the problem, would ask well if you had poured concrete, because the attenuation of a blast wave thru concrete that you would backfill would be different than if it was in just earth.

Mr. Hansen: To understand what the nature of the barricading is perhaps this sketch will suffice. (demonstrating on blackboard) The point of the underground magazine is that in addition to being belowground this roof consists of a main curve, beams approximately 36" deep, on top of which is about 3 ft. of earth fill, on top of this is being placed a 7" concrete pavement. It was certainly the thought of Ordnance in which the Corps of Engineers concurred that initially most of the blast effect will start to propagate out of this opening which is 9 ft. wide and 52 ft. long and which is covered normally by a steel door of relatively

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light construction, 3/16" steel plate makes up these doors, so that it might be assumed that these doors will go out of here very quickly indeed and somewhat in advance of this quite massive construction here. That is the reason why we assumed that the structure should be reasonably duplicated. In considering our costs, we estimate that one of these magazines assuming that we omit all of the electrical and mechanical features, would come down to the order of \$70,000 per magazine, for the construction. The cost of the magazines themselves appears small in comparison with the total cost of the tests inasmuch as we estimate these targets to average \$19,000 each, if eight are placed about each magazine, you would then have some \$154,000 in housing. The houses represent a considerably greater investment than do the magazines. It is of course possible to in some of the estimates reduce costs somewhat if we do just a hair of simulation. For instance this personnel shelter is quite an expensive thing whose influence upon the external explosives results might be considered minor. Perhaps there is some volume there, anyway those are comparatively minor points I think. The centerline of the missiles rests on racks, just about mid height of the 10 ft. You have the elevator space vacant as Mr. Batley pointed out and then you have somewhere around six feet clear. It was most unfortunate that an incident occurred in New Jersey which made the attendance of Mr. Batley and Mr. Tyler at a conference called in DCS/Log impossible. I was over there, there wasn't much of a conference, but I should relate to you some of the things that were figured there inasmuch as they bear a lot on Comment No. 2 from DCS/Log. The questions raised for the ^{re}consideration of Ordnance and for the consideration of this Board included in a general way a survey of all of the objectives and the alternatives that might suggest themselves. I drew informally the idea that it wasn't particularly the specific alternates that were placed in that memoranda, those were examples of alternates that had



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come to Col. D'Arezzo's mind, but I don't think it was intended attention be confined to those particular alternates. I remember it was discussed that actual boosters might be employed but the remainder of the missile might be simulated. The reason for this is, DCS/Ops was present and pointed out that the difficulty in consigning 18 missiles is that production schedules for the next months are pretty tight. However, boosters might be considerably more readily available since, the Ajax missiles have boosters, we have thousands of Ajax boosters, whereas we don't have very many Hercules missiles. They could consider alternates to represent the explosives containing either actual warheads and simulated sustainer motors or both combinations might be considered. I realize that Ordnance has thoroughly considered this and advised against it. I must say that the Corps of Engineers does take the position that it is not the expert organization on explosives matters and therefore we really do not concur on what is possible or what is not possible, because we don't feel it is ^{within our scope} ~~possible~~ or prerogative to hold very much opinion on explosives subjects. I should say incidently that the houses, if you're not aware of this, we found certain houses of brick and frame had been used previously under auspices of Federal Civil Defense and it was our proposal and concurred in by Ordnance, that the same design of houses should be adopted here, simply because there may be direct relationship available and because here is a design which has been already carefully considered. We agreed that it seemed best if these houses had basements, as they did in Nevada, because there appeared to be possible ground effects which might make the presence or absence of a basement material. This might be subject to review.

Mr. Batley: As Mr. Hansen has pointed out, there is reason to believe that a test in ^{an} open hole covered with expedient materials, it's not equivalent in the

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 sense that we do have/aspects that have to be incorporated in order to get a true picture of what will happen under a deliberate initiation of a single order. For this reason we have discarded the economy that may have occurred thru the digging of a hole. It's not intended by those remarks to say that under certain circumstances of test requirements that the following do, in our opinion we feel it will not be satisfactory for this type of test.

Capt. Jenkins: The Board's first analysis of this problem, we pointed out the true hazard was the aboveground hazard. Then in our next analysis of it, we analyzed it on the basis that 25,000 lbs. of explosive was going to go up as one. We know right now that 25,000 lbs. is not going to go up en masse as one, so why then conduct these tests on the basis that it is, when we know it already.

Mr. Batley: The tests at Aberdeen I think have omitted this reference. The tests of the sustainer motors and the 600 lb. warhead that was conducted at Aberdeen was done with the idea of economy in mind, therefore, the grain was held in a vertical position with the warhead mounted in its position with the grain but both were aboveground. The single initiation of the 600 lb. warhead gives quite a different result both impulse and pressure-wise aboveground than it would in a missile initiated in a horizontal position in a box which for appreciably long periods of time when we speak of detonation, will hold intact. For that reason while we say that that we think the double base propellant will not go based on what we noted with Nike Ajax, it is I think immature to say that it won't do it in here plus the fact that we had a total involvement at the Nike Ajax incident of about 1,000 lbs. of explosives. But that 1,000 lbs. of explosives was contributing to that explosion at some unknown time interval, it was not simultaneous, we have 3/4 of that in one warhead and the simultaneous of that explosion in one box will be of the order of the time it takes from that



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missile moving from the initiated missile of the order of 7500 meters per sec. to its neighbor which is rather small. We might get quite a blow in the first go-off, 1800 lbs. is what we expected as the initial result, that's the reason we'd like to hold it, we'd like to see what comes out of the hole and we've made arrangements to instrument that, we'd like to see what does finally come out as an afterthought.

Capt. Jenkins: What I'm getting around to is preliminary and very much simplified tests of this nature moved underground would give us a tremendous amount of information, we still have doubt between aboveground and belowground. We can still move a simplified test underground and get valuable data.

Mr. Batley: I think modifications of the tests could be arranged to provide a great deal of technical information. I'm not so sure the modification will provide the precise type of knowledge that we want. That's the reason for our approach to the problem and the discarding of those portions which will give much more information possibly, but will lack in the precise information we want.

Mr. Roylance: I have one question, is the operational concept the same with the Hercules as with the Ajax?

Mr. Batley: That's the second part of the question. I think it is fair to state that we do have quite a few missiles, it is also fair to state that after we find that it is not so essential to have such large numbers aboveground. This is one of the concepts that we have adopted and I think that it's worthwhile repeating. We feel that for the practical usage of these boxes and missiles, that the risk is acceptable to the populace if there is a bonafied ..or the bets are all off. As one launches the missile, it could fire on the launcher or it may fire at the 528 or 1000 ft., but to the best of our knowledge and belief for all intents and purposes, the missiles could be detained belowground and

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brought up occasionally. But it is not for us to say since the preliminary design and acceptance or approval of that box was with the missiles belowground and training missiles of the kind that wouldn't cause any trouble. To approve or disprove 528 ft. is safe when all the missiles are aboveground, we need no test at all, in my opinion, largely because we have a tremendously effective fragmentation type warhead which even at 1200 ft. is inadequate to protect against. So, full belowground introduces an additional missile hazard which in my opinion can't be calculated or guarded against under the circumstances with which we have to operate. That's been brought up before. If all missiles in each adjacent section are erected and you do have a misadventure at one I feel confident that if it happens on the one section, it will go down the line just as sure as we're sitting here. I think evidence is ample and I think the warning is proper. That's something that we can't guard against, we can mention, but it is not in my providence to say you can't have those missiles up there if the technician says I must in order to shoot these birds out of the sky. It is our responsibility to go on should one fire, that's the last one you'll fire.

Mr. Roylance: What I'm getting at, isn't it the Board's responsibility and possibly yours knowing that they will be aboveground to so locate them that damage will be at a minimum.

Mr. Batley: We have pointed that area out, that there are two distinct problems, one the missiles belowground at 528 ft. and the tactical requirements that says it is essential that the missiles be aboveground. This test will add nothing whatsoever to what will happen aboveground. You can have six missiles aboveground and that's the end of it and you're going to knock things down. This is in my mind just as true as if the sun will rise tomorrow, maybe we won't see it but it will be there.

Mr. Roylance: That's why I can't tie these two things together very well.

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We're locating the boxes on the basis that an incident is going to happen while they're underground, when 10%, 40, or 50% of the time, they may be aboveground.

I don't think the two jibe

Mr. Batley: There are inequities I admit it, the approval was as I stated with the missiles belowground and in the box. Since operational concepts may have been brought into it, the challenge is that the storage magazine per se is suspect when they are belowground, not aboveground. If the distance is inappropriate when all the missiles are aboveground and it has been established that they will either elevated or on the launchers ready to go, be aboveground 24 hours a day, then we don't accept the 528 ft.

(someone said "or being modified.")

Mr. Batley: Well, history shows that such modifications have taken place and I'm not so sure that future modification will be taken in the same place. I think we always have to modify missiles in order to make progress, but if it has to be aboveground, then your 528 ft., we don't accept. It is as simple as that.

Mr. Roylance: Shouldn't we locate sites like this on your normal operational procedure.

Mr. Batley: Sure we have a lot of boxes. There is a need to modify that box to accommodate Nike Hercules. I think that we have several hundred of these sites, Nike Hercules is not at those sites right now but soon will be. If it is found that these boxes can be modified and utilized for Nike Hercules if the missiles are belowground it would appear to me that original concept of the newest might well be used instead of having the missiles aboveground. I do not know this but I have a suspicion that it is the desire to prove or disprove that the boxes are all right as now located rather than going out and buying new real estate which is impossible in most cases. I think there is another concept of the Nike Hercules which is an aboveground situation. Those sites are aboveground sites and have

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been positioned accordingly.

Capt. Jenkins: We have reviewed that and it's a new concept altogether.

Mr. Batley: So have we. My purpose this morning was not to try and establish new attitudes of missiles aboveground but to try and get agreement that if they are belowground this kind of a test I suppose is developed by the information that we need.

Mr. Roylance: I would agree with that, what I wanted to bring out was that if the Board does approve such a test, that it will be on the basis that it was for underground or in the box storage only. It has no relation to how many missiles are aboveground or for how long.

Mr. Batley: I think that's proper and I think that information has been provided.

Capt. Jenkins: In other words, this series of tests whether they're like this or whether in some other fashion will in effect answer only the belowground problem.

Mr. Batley: Correct.

Capt. Jenkins: Absolutely no bearing on what would happen if an ^(aboveground) incident went?

Mr. Batley: It might have a bearing on it but it is not influential. No matter where you put your barricade it is not effective, for two reasons, you have to put it too far out in order to get your other facilities in between and also at the same time you're going to have to have room to launch these things and get them to moving around. Barricades in many cases are impossible to construct.

.....
The distance of the class 9 explosive is one that may not prove itself in this particular test, largely because of the separation that is shock absorbant between. I am convinced that that same propellant coupled to that 600 lb. burn will react with some degree of high explosive intensity.

Col. Fincke: Couldn't this be determined without going underground in this big type of a test?

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Mr. Batley: Aboveground has quite a different aspect than an underground explosion, because you do concentrate a lot of other things.

Mr. Roylance: We have found in tests of similar types of propellant that if you put enough high explosive there you can get it to detonate. In this underground thing, you are adding to the possibility that it will detonate, so that actually if you're going to make these tests underground

Col. Fincke: It looks to me like you'd want to determine this with a less than \$70,000 box.

Mr. Batley: I think there are several million dollars involved in this but in our opinion, the dispute has been going on for many many years among propellant manufacturers and propellant users.

Col. Fincke: Do you feel that if you carry this test out as you have it planned that you're going to be able to classify that as a 2 or a 9 with some assurance that it is correct?

Mr. Batley: Application of 2 and 9 as far as hazard classification is concerned, differs as day and night depending on the relationship as I just mentioned to the planner. I mentioned briefly that high explosives class 9 propellant as such could well be a class 2 as far as reaction is concerned, saying, in other words, it will not react and contribute in a high explosive sense. If you take the polysulfide sustainer grain out/^{between it}and move it up next to 600 lbs. which might well take place, you might have a class 9 propellant which will immediately cause an argument - well, it was class 2 in Nike Hercules, why is it in Nike Sparrow? Incidentally, I would like Col. May and the Board Members here to realize that we have not overlooked the nuclear reaction but I think that we all here are aware of the uncertainty as its precise contribution when it is of some magnitude which makes this distance or twice this distance quite inadequate and we feel that if we are

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given a warhead which will react nuclear or in that regard, there's not much we can do about it, except say it might happen. So many of them are in the category of a 1 point detonation not of the nuclear yield or proportions that we should be concerned about.

? - Comments by Colonel May, AFSWP, have been deleted.

Mr. Batley: White Sands has been notified of the tests.

Col. Fincke: You mentioned that there was a new plan for this Nike Hercules construction. Are we considering aboveground storage for this, what kind of distances are we using for this new facility?

Mr. Batley: You are using the inhabited building distance for aboveground missiles, depending on the number of missiles aboveground.

Capt. Jenkins: (pointing to illustration on blackboard) This is the design which we cleared informally with Board Members before the last meeting and brought it up at the meeting, in approving this new concept.

Mr. Hansen: This is an earthbound barricade in which it is proposed to carry two missiles in a cell, the extent of protection is this, that when these missiles are horizontal they are in aboveground barricaded situation. If you direct one or both missiles they become essentially unbarricaded. The safety distance considered is one which corresponds to the barricaded condition aboveground.

Col. Fincke: Are you using 3,876 lbs. of HE per missile?

Mr. Batley: About 5,000 lbs. each.

Col. Fincke: In other words, this is barricaded distance for 10,000 lbs.?

Mr. Batley: Yes.

Col. Fincke: I was curious as to why you selected 1170 ft. as the farthest out you were going to put any instrumentation. What governed this?

Mr. Tyler: It's the ^{aboveground} /barricaded distance.

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Capt. Jenkins: The curved design is being based on that 1170 aboveground barricaded distance.

Mr. Tyler: It was actually based on the barricaded distance for 9,000 lbs., two missiles in a single cell.

Capt. Jenkins: I mean in the original design. To reiterate, the purpose of this conference is to approve or disapprove whether a test of this nature will get the required information at 528 ft. distance.

Col. Fincke: We agreed earlier that ^{at} 528 ft. from this thing you would get an overpressure of 1.5?

Mr. Tyler: You did not agree to it sir, that was our estimate.

Col. Fincke: As I recall there wasn't a lot of disagreement. Did the Board Staff go along with that, that this was above the psi that the q-d should provide?

Mr. Roylance: That's the way I understood it.

Col. Fincke: What's the psi that q-d would require?

Mr. Batley: I suppose it would be .6 or .7.

Col. Fincke: Then what we're trying to prove here is that 1.5 is safe enough for inhabited distance rather than 1.7?

Mr. Tyler: This 1.5 was based on an explosion of a total of 25,000 lbs. at one time.

Col. Fincke: This is still a contention that you want to design this for 25,000 lbs.

Mr. Batley: No, that's not so.

Col. Fincke: This is what was given to the Board when we said it's not adequate previously.

Mr. Batley: Initially it was fully presented, I'll take the responsibility for that. Secondly, however, the rebuttal is clear in explaining why in spite of the fact that we had 25,000 lbs. in there potentially, certain attitudes of the

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can go back and the design is not complete yet, in spite of all our talk on this new aboveground concept, we might even be able to reduce that to some substantial figure because if this will not react and involve all, our belief that pound for pound ~~is~~ double base propellant will contribute to this and about 12% of the polysulfide, maybe in their box that is not so, we don't believe that it will and at least aboveground it has been proven once that it won't. If that is so in the box and we have six missiles, then it is conceivable and would seem logical to me that if it doesn't go into the box it won't from here, etc., and if it doesn't involve this in the box it will not in here in spite of the fact we won't have tests but I'd be willing to gamble on it. And that means that there is substantial saving to the United States Government at the now assessed distance. So it does have other implications beyond the box.

TNT
[Handwritten notes and arrows pointing to the text]

Col. Fincke: The point I'm trying to get at is, are you instrumented and are you going to find out what your HE is with all this stuff in the box?

Mr. Batley: Yes, that's what this instrumentation is designed for.

Col. Fincke: Well, the instrumentation outside isn't going to give you that.

Mr. Batley: Yes it will. What happens on the outside is in direct relationship with what happens on the inside.

Col. Fincke: You're aren't going to be able to extrapolate that good.

Mr. Batley: You will by time and impulse be able to calculate by rather close relationships what did go in terms of pounds of TNT equivalents.

Mr. Roylance: Disregarding the effect of the box which may have some bearing.

Mr. Batley: It may have some bearing, but I think by and large it may not be of as great magnitude as we think. I don't know if the Engineers are going to put that much reliance on that additional 7" of pavement but it is substantial.

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Capt. Jenkins: Are you asking for additional information which might be available; if it is advisable to conduct these tests in their present concept, is that your question?

Mr. Batley: The objective of the tests, the effect of the missiles in the box, to attenuate the blast effects on quarters 528 ft. from the structure, the missiles are belowground, the question is that in arriving at that target, is it not proper that tests be conducted as we have proposed and is it not improper to produce an explosion not exactly as we would expect it in the field. We recognize full well what Mr. Roylance brought up, there may be missiles aboveground in varying numbers, one doesn't know that, but the test was on the box itself with the missiles contained therein and the destructive effects of such an explosion in the box at the houses located at the boundary at 528 ft. Is it not proper to use a box and the missiles as they are constituted for field use, to establish once and for all, will they or will they not. I think it is.

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Mr. Roylance: It isn't our problem to decide here, in view of the fact the Board asked Army Ordnance to run tests to show the sufficiency of the box to protect houses at 528 ft., merely to determine if the tests they propose will show this, rather than to say some other tests may show it too. I think all we should do is pass on the sufficiency of the test that the Army Ordnance proposes and let them worry about getting the stuff.

Capt. Jenkins: I don't think it's right and proper for the Board to be on record that we are demanding or requiring tests of this nature.

Mr. Roylance: I don't think we will be, I think we will be saying that the tests the Army proposes are adequate to tell us what we want to know.

Mr. Batley: It appears that the objective will be obtained by the tests.

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Mr. Roylance: If they wanted to submit something else of much less scope it would then be up to us to decide whether this was adequate to show us what we want to know.

Mr. Batley: As a volunteer statement, Capt., there are two houses at each of the cardinal points, there may be areas of dispute and discussion, can't we get the same information with one house of frame here and one brick house there, maybe you can, but under the uncertainties of the situation, I'm not prepared to say at the moment you could. I would rather have houses of both types of construction in order to prepare favorably technical information, one to the other. There is another area of approach that if one knows the pressure he can predict the type of damage that would occur, therefore, we would need no houses and save \$20,000. I am not about to embrace that because we have had discussions on pressures and damage and impulse ever since I can remember and unless there are pictures to show that 1.5 psi and .97 impulse did this damage, it means nothing.

Capt. Jenkins: I don't believe there would be any question about this, that we're all interested in getting the best most accurate information available at the least amount of money.

Mr. Batley: It may have been confused the way I presented it, but I had hoped it would be understandable, could I get an expression of opinion, from what I have said, do you believe the objective of the tests as proposed can be achieved by the test program as proposed, one, and two, is it not so that you would be better satisfied with a true test using ^{two} two missiles in a true box rather than a simulated.

Col. May: I think Mr. Roylance has actually painted this thing as we see it. As far as being for realistic tests, we are, we believe this is the only way we get the information we really want but to give you an answer, it takes our people weeks to study a proposal like this.

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Mr. Batley: There are many ways of modifications but I do think true tests are of real value in a case like this, not simulations.

Col. May: Who is doubting the accuracy of the 528 ft.?

Mr. Batley: AFSWP.

Col. May: Is it AFSWP?

Mr. Batley: I have heard that they do not consider it adequate for these test purposes.

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Capt. Jenkins: There's no question that the Board in a not unanimous decision expressed doubt on the adequacy of 528 ft. distance to the boundary on the basis of 25,000 lbs. of material in that box going up simultaneously. That's the last evaluation.

Col. Fincke: To prove that this 25,000 lbs. is a key part of it, because if it isn't 25,000 lbs. then no-one has said that 528 ft. is inadequate. We've only said it is inadequate for 25,000 lbs. of HE.

Mr. Hough: The effect of the underground or partially underground is also unknown, actually I believe you should spend some more money and find out, at least check this for the HE equivalent under the conditions of the structures.

Col. Fincke: I think so unless you're going to figure on 25,000 lbs. and live with that.

Mr. Roylance: I think this whole test proves that either this installation's use or intended use is adequate or it isn't.

Capt. Jenkins: Col. May did you have some comments.

Col. Harper: As Col. May has already said, this 528 ft. came up as a result of the other service member not concurring.....



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Capt. Jenkins: Is a vote then in order, are the tests conceived adequate to show what we want to know?

Mr. Batley: Yes, one, and two that a simulation of the circumstances as proposed here might not give us reliable results that we are seeking.

Col. Fincke: Are we going to get any advise from our technical staff? I think as a Board, our staff should give us technical advise on this.

Mr. Roylance: I'd like to add one thing to that. Should we really vote as a Board on whether a simulated test without knowing what simulated test we're talking about, it would serve the purpose.

Capt. Jenkins: Rather than simulated, simplified would give us the information.

Mr. Roylance: I don't think I'm ready to vote on that without knowing what the test is.

Col. Fincke: Nor do I. We have two propositions before us as I see it, one from the Ord Corps and one from DCS/Log. My first question is which one are we considering or are we considering both?

Mr. Batley: They're both wrapped up together.

Mr. Roylance: If you're tying the simulation down to the specific items mentioned in DCS/Log's letter I would say no. But if ^{we're} ~~they're~~ talking any simulated test, then I'm not going to vote. I don't see how we can vote.

Mr. Batley: As far as I'm concerned, simulation is^a/parallel to get the same results. Simulation is for all intents and purposes a special construction of the same kind of warhead you're going to use, the same kind of booster, and same kind of skin and sustainer motor. Because of the magnitude of these results, it seems to me the word simulation if we use it must mean the precise article, but probably built special and not taken out of production. That's the only simulation I could accept in arriving at the target we're trying to hit.

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Col. Fincke: What's the difference between Nike Hercules and Nike Ajax?

Mr. Batley: There's quite a difference essentially, Ajax has three separate warheads, one in the nose consisting of about $4\frac{1}{2}$ lbs. of explosives, one ^{removed} from it several feet containing about 94 lbs. of explosives and another containing about 55 lbs., all connected simultaneously. But between that and the double base propellant which will be essentially the same formulation for the Hercules, there will be substantial metal containing red fuming nitric acid and JP3 or 4 fuel and a space and the end of the booster base.

Capt. Jenkins: Would this be better, preliminary or simplified tests may give sufficient information to eliminate the need or requirement for these elaborate tests as they are set up right now.

Col. Fincke: It says if you do some preliminary tests it may preclude doing this.

Capt. Jenkins: It will give us some information.

Col. Fincke: I'd like to go back to what Mr. Roylance said earlier, I think we should pass on one of these two proposals, it appears to me that the Ord Corps proposal - does this get the data we need to answer the question the Board raised that this q-d is not sufficient. If you go into the details of how they do it and how they instrument it, etc., you have to sit down and analyze this in detail if we're going to come up with something.

Capt. Jenkins: If you want my opinion, I don't think it does.

Mr. Hansen: (wrote on blackboard) I merely wrote those up there for you to look at gentlemen. There seems to be two areas in question, one is as to what the HE equivalent is and another one is as to the effects of the particular environment underground. There may be such effects upon the first question as Mr. Batley brought out, the underground environment may affect the HE equivalent. The underground environment may also effect the extent of the damage sustained at a

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distance from the detonation of any given HE equivalent and we do have before us, or you do gentlemen, the question of whether these effects are separable from any instrumentation outside or within. The attempt to separate these two things appears to me a novelty but a pertinent one.

Mr. Batley: All of the information that is available probably hasn't been mentioned this morning but I think there are test results of damage and I think that it is possible to interpolate with considerable accuracy the effects of structures and the psi that will be gained by an aboveground explosion of 25,000 lbs. of explosives. I think the literature is not complete but I think there are references to 25,000 lbs. of explosives at known distances belowground, we have used them, the British have used them and the psi at a certain distance, so we have those two. We also have, I think, some information, while it is not as complete as the other, of the effects of a ground burst of high explosives surrounded by some barriers. What we do not have is information on a structure such as we will use, now with the others and with what we have, I don't think it's an impossibility to interpolate what we get in the reaction in that hole, I think it's quite simple.

Mr. Roylance: The thing is that this is not strictly aboveground and it's not strictly underground. It seems to me that the only way you're going to find out exactly is to build one.

Mr. Hough: You will also gain an idea of the fragment pattern.

Mr. Batley: We expect a camera to catch the debris and we will estimate with a reasonable degree of accuracy the velocity of this departure and the damage it does and where it fall, etc. is quite obvious.

Capt. Jenkins: Well you Board Members have heard a presentation of this, without going into technical angles, we've been thru that many times, would you like to

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express an opinion on it now or would you like to think about it.

Mr. Roylance: I'd just as soon do it now.

Col. Fincke: I won't be any smarter a day from now than I am right now. I still would like to find out what the technical staff of the Board thinks of this.

Capt. Jenkins: As Chairman I should refrain from saying anything, if there is not a unanimous vote on it, I would have to express an opinion on it. I could ask the staff members to give you some information on that if you would like.

Col. Fincke: Well has our staff reviewed this?

Capt. Jenkins: We have reviewed it, yes.

Col. Fincke: Can we have the advantage of their opinions?

Capt. Jenkins: I have prepared a memorandum which I discussed with the staff members in a preliminary conference a few days ago, it's my own memo, ~~ixixix~~

Col. Fincke: The only thing I'm interested in is does the staff think this answers the question, you've had the plan over here from the Army for a month, will this show whether this does or does not give us protection that we think it does. Has the Army designed the test which will answer our question? ~~xxxxx~~

Capt. Jenkins: On the basis of 25,000 lbs. going up at once?

Col. Fincke: I know we have to modify this to say the basis of the six missiles in there. I hope we can determine some magnitude of what the HE equivalent is, whether it's 25,000 lbs., or whether it's just the six warheads. //

Mr. Roylance: The recommendation was that the Army conduct tests to determine if there really was 25,000 lb. equivalent. To me it doesn't make much difference whether there is equivalent of 25,000 lbs. or the equivalent of 10,000 lbs., what we're concerned with is what comes out and what ^{is} the effect on the targets outside. If the houses stand and are not too severely damaged, we don't really care.

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Col. Fincke: We do to build up our general knowledge of explosives, don't we?

Mr. Roylance: You can't build up general knowledge of explosives with a specialized structure, that's what this is.

Col. Fincke: You get certain results from certain circumstances, that's what we do in all of them.

Mr. Roylance: The only time we could use the knowledge gained from this is if we had the same kind of structure with the same approximate amount of explosives.

Capt. Jenkins: This will give us one specific answer to a specific problem.

Mr. Roylance: Is the box as built and as located satisfactory for six Nike Hercules? That's the whole problem.

Col. Fincke: I agree. The only thing I'm saying is this ought to give us a little data to use in the future.

Mr. Batley: Anything that comes out telling will the structures be damaged or not damaged will be bonus, simply and to the point. But you can't get all the information that is desired to place in the archives for future use on a specialized test. A million dollars is going to produce a lot of information. Maybe for the same expenditure of funds we might conduct numerous experiments of different types with different quantities. All of those together would not answer the question that's before the house. You've got to answer that one first, it's as simple as that.

Capt. Jenkins: Will this test as it is set up give us information on the relative safety of the box with the six missiles belowground in the event of an incident? I would like to add one other statement before a vote on it, that I don't want it indicated that the Board as such has recommended these tests in the exact form.

Mr. Batley: The Army has conceived the test ^{to provide} for the type of information we need and we are asking the Board ~~as~~ with the objective of the test and the special

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application, will the test program developed give us the information we want?

Will it or will it not damage the houses beyond habitation?

Capt. Jenkins: There will be no doubt about your answer to that question.

Mr. Batley: I think the results are going to be extremely valuable. I am as convinced as I am sitting here that to get those results, one can't approach the test program in other than the way we have proposed it with the possible exception of accepting pressure and impulse readings as opposed to physical damage to houses and I wouldn't accept that either because there are too many doubting Thomases.

Capt. Jenkins: Here's the question - will this test as proposed by Chief of Ord give us the information on the relative safety or hazard of the box with the missiles in their belowground position.

(portion not recorded)

Mr. Batley: We recommend, in spite of the loss of time, that one structure and eight houses be erected and tested, but it's not a hard and fast rule with us, we do insist that multiple structures if built in terms of housing, not be in an area that will be preliminarily damaged by the first explosion and expect to use it for other tests, because all bets are off. If multiple houses are built they will have to be in a place where they won't be damaged.

Mr. Roylance: What I was getting at is if the first test shows the desirability it might be relocated closer in, we might do that.

Mr. Batley: Actually the premise is, will the 528 ft. be satisfactory and I think it will be duplicated in any other tests that follow because that's the question under dispute now. The interpolation of pressure and impulse might reveal with this damage it's not so bad, maybe we can move into 400, but we do have that information on which to base a fairly good conclusion. We can or we can't.

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And contrary to that, if it is of such magnitude that all we have is basement left, then we go out farther. I think instrumentation as proposed and developed will give us that information within an area where we can expect anything but glass damage.

Capt. Jenkins: Again repeating the question, will this test as proposed by Ordnance give adequate information on the relative safety or hazard of the box with six Nike Hercules missiles in their belowground position?

Mr. Roylance: Yes.

Col. Fincke: Yes.

Mr. Batley: Yes.

Mr. Tyler: What about the DCS/Log proposal of simulation, will that give you the type of information you want?

Col. Fincke: We heard that this DCS/Log proposal was only to consider such a provision, that they weren't set on any specific idea.

Mr. Batley: When one examines what DCS/Log said, there are very few other alternatives.

Mr. Tyler: They were very definite in getting the Board's opinion.

Capt. Jenkins: In other words, will more simplified tests give us adequate information.

Col. Fincke: This is where you're going to have to get your technical people to analyze that and make a statement, I'm not prepared to vote on that.

Capt. Jenkins: Would you want a staff look-see at that before we make any decision?

Mr. Roylance: That's a long thing, can't make up your mind on the spur of the moment. I'd like to say one thing, that I wouldn't be satisfied, that 25,000 lbs. preliminary test is going to prove anything other than 25,000 lbs. of HE will

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do this much damage. This is only part of it in the first place, we're not convinced that there's 25,000 lbs. in there, as far as that part of it is concerned I would say no this won't provide the information we want. As far as the rest of it is concerned, I'd have to sit down and work with it a little while.

Col. Fincke: In the first part of it he said, arrange to simulate the missiles to try to get the worst possible. This would be the worst possible and if ~~the~~ you simulated the missiles I don't know just how you would do this, but if we agreed awhile ago that simulate was parallel or make the same as, this might do it depending on how they do it.

Capt. Jenkins. Is a vote in order on that one?

Mr. Roylance: If the one we have discussed up here is in the Army proposal, then we should get another one.

Mr. Batley: It asks for our evaluation and it proposes certain things. Those proposals have been considered and discarded as not producing the type of information we needed.

Mr. Roylance: Then we are to take it that this proposal up here is the —

Mr. Batley: The Army official position on the thing and I might say that it is the supply of the missiles that is standing in its way.

Mr. Roylance: I don't think we have to vote. //

Mr. Hansen: I would again call your attention to the one other aspect which you have been asked for your comment which was that in the event 528 ft. should be proven insufficient should not the tests produce data of some sort as to what distance would be sufficient and it was in line with this that the suggestion then was put in for a different arrangement in which houses would be located at varying distances.

Col. Fincke: We have these blast gages at 1170 ft., they're going to get additional

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information so that if this is inadequate Mr. Batley said they can extrapolate out to what would be unless the 1170 ft. is inadequate too.

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Capt. Jenkins: / I don't feel that there should be indications that the Board as such has given this test exactly as it is, its unqualified approval as the only one to give us the information. / In other words that some other more simplified preliminary test, etc. might do the same thing.

Mr. Roylance: I don't think we're saying that.

Capt. Jenkins: Do you staff representatives who have reviewed this thing feel that way?

Mr. Wiesenberg: If the purpose is only to find the information whether six missiles of the type we're talking about will have an effect on the structures 528 ft. away based on the type of risks that we take at inhabited building at the present time, the set-up as I see it as submitted by the Army is all right. If we want to go beyond the point in question then, now when you get that, so what! Is it the purpose of the test to find that/^{if}it isn't good that you're going to then submit something to the Board how far to go with it so as to get it within the range of the acceptable risk and if so we'd have to really look into the fact whether the 1170 ft. is a fair distance to consider in case 25,000 lbs., which I do not believe will ever go up, is the proper distance to go to for this test. You should possibly arrange to go to 2500 ft. instead of 1170 ft. On the other hand, why couldn't it be possible to make a test of a complete unit and see whether the total amount involved instead of being 4200 lbs. is only equivalent to maybe 1,000 lbs. or 1200 lbs. We have enough literature at the present time when we consider missiles with relation to one another to avoid a mass detonation. There is a lot of literature on that. Based on that one

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preliminary test alone, a lot of analysis could be made with the possibility that this particular test will not have to be made. As I say again, I don't quarrel with the idea that if you make the test you will get that information except with that 1170 ft., but I say is it necessary to make the test until you make a one preliminary thing alone and see whether the sustainer booster plus the 600 lbs. and the 534 lbs. the 580 lbs. in the warhead gives you the amount you think it does.

Capt. Jenkins: I think the Board should carefully refrain from a commitment on saying whether or not the DCS/Log test, as a substitute for tests which we've already approved, will give better information. There are a lot of qualifications, are other more simplified tests in order? Could we get the same kind of information from more simplified tests? Is any vote necessary on this? You say they have asked us for an answer; are we ready to give them one.

Mr. Batley: The simulation seems to have been taken care of quite adequately. I

Capt. Jenkins: They're just giving just general ideas and alternatives, we should refrain from treating that as exact and specific.

Mr. Roylance: The structure itself has a decided bearing on this, also the fact that there are other missiles present. In order to make your preliminary test as I see it you would almost have to build a structure the way you have it now.

Capt. Jenkins: There's the question of the completeness of the information which this test will give, the expense and availability of missiles. Is there some other alternative which we think might be possible to substitute.

Mr. Batley: Don't forget that DCS/Log's suggested use of six missiles for the first one was catastrophic.

Capt. Jenkins: I'm not sure yet whether another vote is in order.

(Capt. Jenkins reads thru DCS/Log letter again)

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Mr. Wiesenberg: You have to obtain the approval of the Board, it doesn't necessarily mean that particular one that we just have now in mind.

Col. Fincke: DCS/Log wants the Board to approve the one they intend to turn back to Ordnance. I think we should say nothing about DCS/Logs proposal unless the Army, thru their representative, wants to bring a different proposal to the Board to consider.

It was agreed that there was no need to answer it here, that the Board should stay out until the Army asks for it.

Mr. Batley: He has asked that should the Board state what other test is acceptable to get this same kind of information, that's over and beyond the scope of this particular letter, but I think I detect a feeling that quite a simplified test probably would give the results that we want. Whatever is developed has to be proved by a full-scale test of the things that are involved.

Mr. Tyler: We originally evaluated the situation and came up with the answer that the 528 ft. distance was adequate. This presented to the Board and they disagreed with our evaluation. They requested tests and it went up to the Dept of Defense.

Capt. Jenkins: I want it understood that 25,000 lbs. was the total quantity which we evaluated. I don't want it indicated here in any way that the Board is failing to recognize the possibility of a lesser quantity than that.)

Mr. Tyler: You asked for tests and it came back saying that tests should be run. We have designed the tests that we think ~~it~~ will give you the information that you want to make up your mind one way or the other. It seems to me that our test has been challenged and will something else give the Board the same information that our test has been designed to give you.

Col. Fincke: I think this should be answered by the technical people in Ordnance getting together with the technical people on the staff of the Board and working out some mutual agreement.

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Capt. Jenkins: That's past and prolog.

Col. Fincke: It appears to me that this test was not worked out with any consultation with the technical staff of the Board.

Capt. Jenkins: / We have voted on the accuracy of this test for certain specific conditions and we should refrain from any comments or expressions on any other tests until we're asked to do so. /

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Mr. Batley: I did want to clarify the point that the initial submission ^{mentioned} of 25,000 lbs. and there was disagreement on several distances and a first indorsement came back which mentioned these tests. The second indorsement back to the Board before the thing was finalized points out the precise things in a four or five page indorsement which I mentioned this morning.

Capt. Jenkins: Still with 25,000 lbs. as the total quantity of HE involved. //

Mr. Batley: But pointing out for purposes of computation that is all that could be placed in there, but because of these other prevailing circumstances it was doubted that it would.

Capt. Jenkins: We have mutual doubts on that.

Mr. Batley: Mr. Tyler brought the point out that there were tests designed to validate or confirm one of the two thinkings by test and we think the tests proposed will do just that and I think the Board members have agreed.

Capt. Jenkins: I think a definite resume of the meeting would be in order to state in unequivocal language that the tests as proposed by Ordnance would give adequate information on the safety of the hazard of the box with the six Nike-Hercules missiles in the belowground position, and that we shouldn't comment on the advisability of any other tests until we are asked to do so.

Meeting adjourned at 1300.

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