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TELEGRAM

December 26, 1959

To: Chairman John McCone  
U. S. Atomic Energy Commission  
Washington, D. C.

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Livermore, California



A. I would summarize the happenings and results of technical working group No. 2 as follows:

1. The Soviets accepted the suggested instrumental changes and ideas for future improvements. They rejected the HARDTACK II results and other conclusions about seismic detection and identification. They also refused to accept the U.S. Delegation formulation of criteria for eligibility of seismic events for inspection, which stretched the technical situation as far as we felt we could go in the direction of optimism without allowing most or all small nuclear explosions underground to be mistakenly identified as earthquakes by the criteria. There was thus no agreement nor any narrowing of the gap between US and USSR on any technical item of substance. The UK, though strongly wanting some kind of agreed report, was substantially in accord technically with the final US report.

2. The contrast between the honesty of the US Delegation and the subordination of technical evaluation to political requirements on the part of the Soviets was very evident. For example, while agreeing to the correctness of the very large decoupling factor of the large hole in private, they denied it at the formal sessions. They made an extremely dishonest presentation to the question of magnitudes, purporting to show that there were only a fifth as many earthquakes of size equivalent to a given nuclear explosion as believed by the Conference of Experts, but offered to leave things as they were in 1958, showing that they did not take their own purportedly scientific position seriously. Most important of all, they made it clear that they would accept a set of criteria only if these criteria eliminated almost all earthquakes from eligibility from inspection, whether or not this was justified by the technical situation. The U.S. Delegation, when it found that it could change its criteria so as to eliminate more natural events without too much risk of misidentification of explosions, did so. The Soviets presented, and stuck to, criteria which would certainly have identified all the underground HARDTACK explosions as earthquakes and made them ineligible for inspection. This kind of behavior indicates that inspection by technical agreement in the international control organization would never occur under the proposed treaty, and is one of

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most discouraging things about the negotiations to date.

3. It is clear from the work of the US technical group during the past five weeks that the system capability is considerably less than believed even a few months ago.

a. The criteria, which were as liberal as we felt could be agreed, leave almost all seismic events equivalent to 5 KT with RAINIER coupling unidentified, and even at some tens of KT a large fraction will be unidentified and, therefore, eligible for inspection. Though the aids of selection are expected to improve this situation considerably, no one can guarantee this, or say how much. This can be found out only through several years of research, and at the end of this time there is a good chance that as many new questions will have been raised as old ones answered.



b. On the other hand, preliminary calculations by Bethe and others, as well as by the Soviets, indicate that a decoupling factor of several (perhaps even five) can be achieved by choosing a different medium, (e.g. granite, which is everywhere) instead of the RAINIER tuff, or a greater burial depth, or a different geography. Though we have no exact calculations and therefore made only a reference to "considerable variation of amplitude" in the report this could mean that instead of for 5 KT, the statement that almost no equivalent earthquakes are identified by their seismic signals applies to 15 or 20 KT. That is, magnitude 4.4 may mean 15 or 20 KT instead of 5 KT.

c. On-site inspection is now agreed by the US technical people to be very difficult, that is, its probability of success may be very small. The failure of geophysical techniques "forces us to place very much greater reliance on aerial, ground, and underground visual and photographic surveys directed toward the observation and detection both of geologic and terrain disturbances as well as those of unusual human activity. Both of these kinds of evidence may be greatly diminished or possibly even completely eliminated in some cases by careful planning on the part of a potential violator."

The Soviets maintain that the experts' report says that on-site inspection has a hundred percent chance of success. They persisted in this with the statement that drilling would always find debris even after Bethe pointed out that the area to be inspected was so much

larger than the dimensions of the radioactive region from an explosion that it would take fifty thousand years to find by that method. No statement about inspection appears in our final report, because it was felt that the subject is non-quantitative, and the statements about it in the experts' report cannot be contradicted. However, it is clear that Soviet and US interpretations are very far apart.

It developed that the probable area of location of a seismic event is more nearly 2,000 square kilometers than the 200 given (though qualified) in the experts' report. The U.S. Delegation tried to allow in its criteria for 500 square kilometers where necessary. The Soviets wanted to consider everything not located to within 200 square kilometers ineligible for inspection, which would eliminate almost every event. If the inspection area is only a fraction of that within which the event is actually located, this situation alone reduces the probability of success to at most 10 or 20 percent, independent of efforts to conceal the evidence.

d. The large hole decoupling proved to be, by the evidence of engineers who have washed out large holes by solution mining, much easier than had been thought. Multiple pump operation could produce a 75 kiloton hole in as little as two years for less than \$20,000,000. In connection with the use of intelligence to find such activities, it is of interest that during most of the construction period only a two man crew would be required.



B. My own ideas on the procedure to pursue now are as follows:

1. We have been negotiating for some time on a comprehensive ban with the idea that the difficulties of policing underground (and deep space) tests would lead the Soviets to suggest or at least acquiesce easily to a threshold idea. It is obvious that they will not do so without great pressure from us. The disagreed conclusions of technical working group No. 2 provide the US with the best opportunity we may ever have to make clear to the world that the proposed control system does not in fact control underground (or space) explosions at all, below some yield (or beyond some distance). This has never been made clear to the world or US public, nor has the fact that no radioactive hazard exists from such explosions. Both of these ideas must be given wide publicity, no matter what our policy on testing may be, simply because they are true and important.

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2. If world public opinion (or our opinion of what world public opinion is) makes all testing impossible for the US even though the Soviet Union may test clandestinely, then it is better to withhold testing unilaterally and not have the control system, because the presence of the inadequate control system would:

a. Lead to a false sense of reassurance. The public would not realize that the Soviets might very well be testing, while without the system they would realize it.

b. Serve as a "first step" toward other inadequate control systems to monitor real disarmament agreements which would place the US in very grave peril by depending on Soviet good intentions for our continued existence.



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c. Generate extreme tension between the U.S. and the Soviet Union by channeling inspections into the most sensitive areas and efforts of the Soviets, the system must rely on intelligence and intelligence will invariably point to the most sensitive areas, without knowing whether they contain nuclear test activities or something else.



3. The U.S. should propose a ban covering the atmosphere, space out to 100,000 kilometers, and underground for yields higher than about 100 or 150 kilotons. The underground situation could be handled by setting a magnitude of about 5.5, which the explosions could not exceed. A big hole to handle much more than 100 to 150 kilotons is still considered very expensive and time consuming, and so developments necessitating such yields would be made very much harder, if it is felt important to inhibit them. A few inspections a year would be enough for events above magnitude 5.5 (I estimate there are only a few tens of such events per year in the Soviet Union), and smaller events would be ineligible for inspection.

4. To avoid Soviet stalling on such a proposal, the U.S. should announce that it now reserves the right to carry out such explosions at any time, and will do so whenever it is ready and its defense needs demand. The actual execution could await an educational plan of the kind described in B.1 above which should be accomplished in a few months. If an actual military development shot is considered too embarrassing at the moment, the DITCHDIGGER experiment might be carried out with the statement that in the absence of an agreement and a detection system, everything is completely a matter of trust, and that the world can trust us when we say that this shot has only peaceful aims. The Soviets have hitherto been able to deflect U.S. attempts at a limited treaty merely by ignoring them, and letting the U.S. put pressure on us to continue negotiating on a comprehensive ban which we know to be technically incapable of being monitored. Another eighteen months of this kind of activity must be avoided, and the announcement that we are no longer bound to refrain from testing would help avoid it. Even more effective would be an early resumption of low-yield underground tests following an educational campaign, which would put real pressure on the Soviets to reach an agreement consistent with the capabilities of the control system.

5. It may be that the U.S. would lose more in allied and neutral opinion by resuming tests than it stands to lose by a gradual weakening of our military strength. However, one should remember that this deterioration could well make us unable to defend either ourselves from a massive attack by denying us the ability to retaliate with mobile missiles which could survive, or to defend our allied and the neutrals with effective weapons of limited war. I find it hard to believe that we cannot explain our case to the rest of the world well enough to reduce to acceptable proportions the

propaganda losses following upon a refusal to accept a comprehensive treaty which is not accompanied by a comprehensive control system.

I think we can make our case. To do so, however, we must take a strong line insisting on a threshold or a limited treaty, corresponding to the capabilities of the system. We must stick to that line. We must let the U.K. know that we mean it and that we expect them to support us in what they know to be technically justified. Finally, we must let the Soviets know that this is our final offer, and that we do not intend to continue the present uncontrolled ban. We can best do this by resuming tests which are allowed under the arrangement we propose without waiting for the conference to act on it, otherwise the Soviets will inevitably decide we are bluffing. The disagreed conclusions of technical working group two, particularly on criteria, provide a logical public justification for such a policy on the part of the U.S. The justification has existed for some time within the Government, where the facts have been known, but we are unlikely to have again as good a peg for a strong and positive policy as has been provided by the results of the technical discussions during the past month in Geneva.

