should be, even at the price of resolution, much less complex and more certain of success. Also at this late date it should be of such a nature that very little basic research on instrumental development be required. The Flunex experiment is independent of the results of the Dinex. It needs less shielding. However it is not clear as to what the signal would represent. It seems to us that a great deal of experimental research would be necessary in order to interpret the response of the detector. The time response of the detector would be satisfactory. However reports have recently appeared which note a long-lived fluorescence which follows a very high level fluorescence. [redacted]

DOE b(3)

The problem of transmitting a light signal of the expected intensity over a distance of 100 to 800 meters is probably not impossible. However, because of the radiation present, an evacuated tube would be required.

We recommend that the Flunex proposal be dropped at this time because of the difficulty in interpreting the signal received and the instrumentation required. We would suggest that the problems of the fluorescent material and optical system, as problems, be farmed out. The understanding being that the "contractor" will do the job with no idea of actually taking part in the coming tests. If during the tests, it is found that signals cannot be transmitted by cables, then the problem should be reconsidered and a decision reached based upon the results obtained by the "contractors".

[redacted]

DOE b(3)

In the event the T+D mixture does not burn it would be very informative to know to what temperature the mixture was raised by the radiation. In the event it does burn it is important to know at what temperature the reaction took place and its duration. Unfortunately, unless the reaction does go it seems impossible to measure directly the temperature of the T+D mixture. The X-Ray experiment hopes to be able to measure the temperature in the matter near the T+D mixture as a function of time. If these temperatures as a function of time agree with calculated values, then it is hoped that one will be able to deduce the temperature of the T+D mixture. If it were not for the one fact that the X-Ray experiment gives some information concerning the temperature whether the T+D goes or not, we would recommend that it be dropped in favor of the Tenex experiment. We say this because the X-Ray experiment does not directly measure what one wants to know and seems to be the most complicated and least understood of any of the "main" experiments. If the Dinex experiment worked as desired we would say drop the X-Ray experiment completely.

In the event that the T+D mixture burns it seems as though the actual temperature of the T+D mixture can be measured in the Tenex experiment by observing the natural width of the T+D neutron group. This natural width results from two causes: rate of burning and relative motion of the T+D atoms (i.e., thermal agitation).

The rough details of this experiment are presented in the following pages.

The Tenex experiment is planned to record the production of T+D neutrons. The neutrons produce recoil protons in a hydrogeneous radiator. These protons are recorded by means of an electron multiplier tube which is connected to a commercial scope. The time of flight principle dilates the time scale and gives an energy selectivity. The time dilation enables

Superimposed on the desired signals is the background due to fission neutrons, gamma-rays, and scattered neutrons. Each of these backgrounds will be taken up in turn and an estimate of their magnitude made.

The fission neutrons are most easily disposed of because of their "time absorption".

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Time of Flight Table

Neutron Energy in Mev	Neutron Velocity in Meters/Second	Δt in Shakes for 100 Meters	Δt in Shakes for 400 Meters	Δt in Shakes for 800 Meters

[redacted]

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A more troublesome background than fission neutrons promises to be produced by gamma-rays. [redacted] This peak yield held up for a time long compared with the times in which we are interested, so we shall assume it to be constant, hoping to err on the pessimistic side. It is claimed (Dinex experiment) that an electron multiplier tube has a discrimination for protons over gamma-rays of $(10)^4$. The following table

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compares the expected signals due to gamma-rays and T-D neutrons with no shielding.

[redacted]

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At the far station one should increase the radiator thickness by a factor of two or three. [redacted]

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If some collimation at the detector is not employed it is conceivable that an appreciable time broadening can be introduced by small angle elastic scattering of "14" Mev neutrons. Single and multiple scattering can introduce an appreciable increase of path length, and since a meter of path is equivalent to two shakes an appreciable time broadening could occur.

If one constructs a collimator 1/2 inch in diameter and 2 meters long then, at the 800 meter station where the scattering effect would be most important the detector sees a circle of 10 meter diameter at the tower. Except for large angle scattering taking place within 10 meters of the tower, single scattering can introduce on the average a time increase of less than one shake. Whereas, those neutrons suffering multiple scattering will amount in number to only one percent of those not being scattered. Under these conditions it is felt that scattering effects can be neglected.