

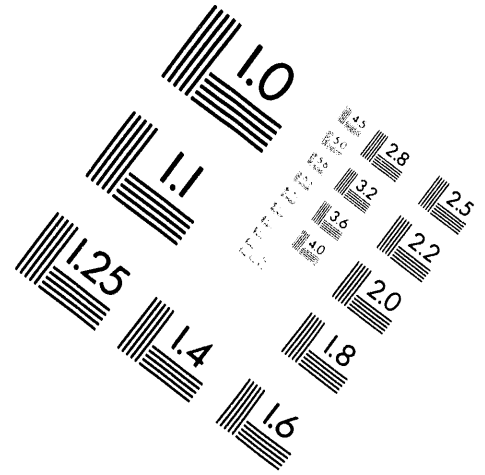
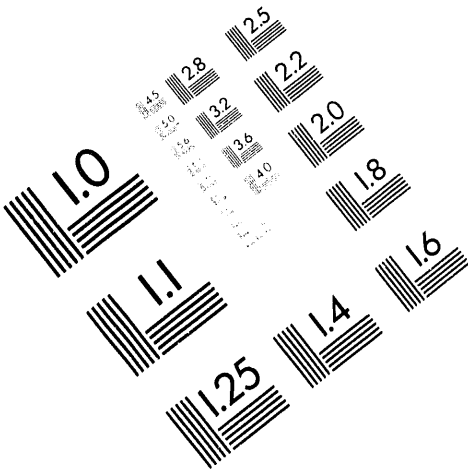


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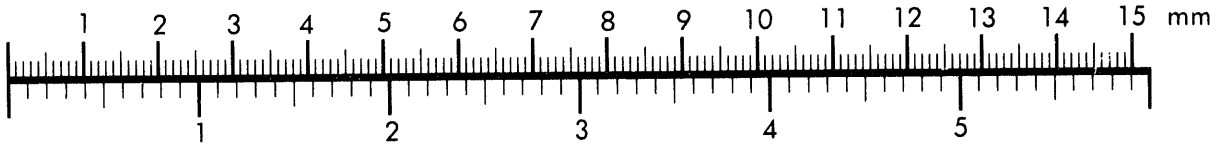
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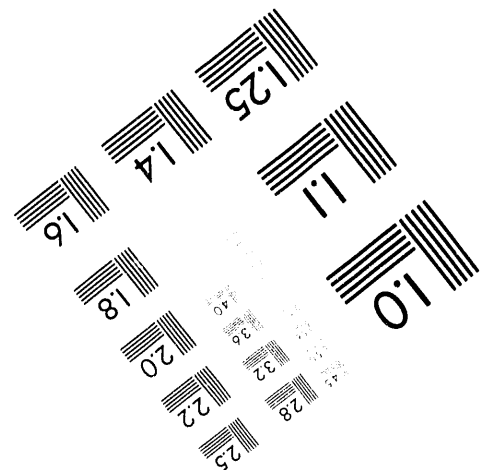
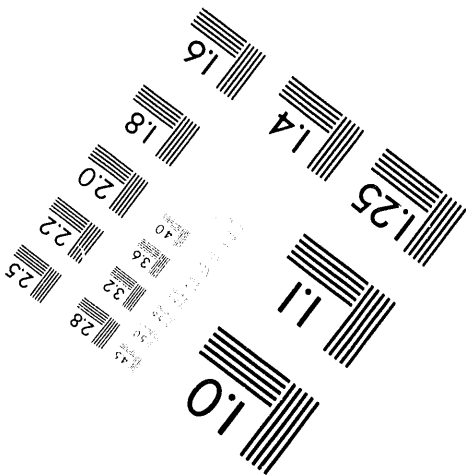
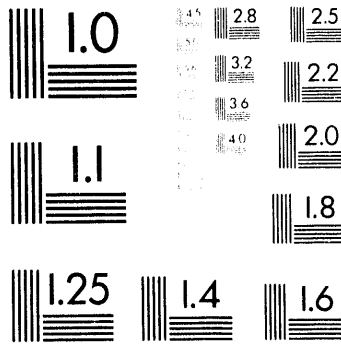
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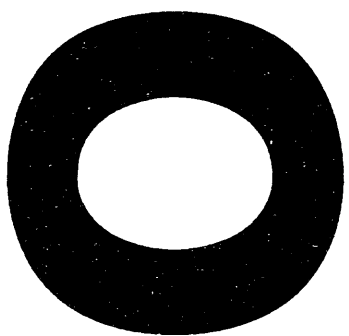
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**Prepared for the U.S. Department of Energy
under Contract DE-AC06-76RLO 1830.**

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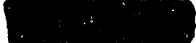




EE-79331 RD

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5 copies. 

U-233

By

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HANFORD ATOMIC PRODUCTS OPERATION
RICHLAND, WASHINGTON

October 22, 1963

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October 22, 1963

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U-233

In my most recent meeting with Larry Germaine and Forest Fairbrother, LRL Physicists, several points of interest were developed. The most important point being the interest in making an early test shot using U-233. It is the feeling of Larry Germaine that time zero for large scale production of U-233 cannot occur until a test has been made. If the test is made using the material produced at Hanford and Savannah on their respective 25 Kg efforts, then time zero for large scale production is about three years away. On the other hand, if a test is made using high U-232 uranium 233 that is in existence, then time zero for large scale production could be as early as late-1964 or in the order of two years sooner.

The problems involved with making a test using existing material are not completely known, though I would anticipate that they will require some real sacrifices and risks to overcome. It would take about 15 Kgs of working stock to make the items for a test. As I view it, the first step would be to put the material through a purification step to remove all U-232 daughters. This would be followed by rapid processing through reduction, casting, fabrication and assembly. It seems to me that all pilot runs to prove out the techniques could be made using normal or depleted uranium so that personnel assigned to the work would take high radiation exposures on just the final runs.

The test shot is estimated to cost between 1 and 2 megabucks, exclusive of the above reprocessing costs. At this time LRL does not have any estimate of the cost for cleaning up and fabricating enough existing U-233 to make a test shot. They would like to have an estimate if one could be made. While they have no authority to request the estimate at this time, it is my recommendation that HAPO

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investigate this facet of the problem and develop a firm estimate of the cost. If we could see our way clear to do this job within the next year, it would put HAPD in a firmer position for the U-233 fabrication business should it become a production item. If we can get the metal made in laboratory facilities, I am sure that O. J. Wick's facilities could do the casting and fabrication job.

The radiation build-up in 1 ppm ²³²uranium ²³³ was also discussed with Fairbrother. At this time the feeling is that the weapons would not have excessive radiation levels based on a four year stockpile life. The disassembly and refabrication problem would be more complicated than it is with plutonium, and would have to be considered in making the decision to use U-233.

The IRL and LASL replies to General Betts inquiring of design agency interest in U-233 were made available for my perusal. The IRL reply was as previously understood, that is, they have a very keen interest in the material for hardened weapons and would like to have about 50 Kgs of the material produced at an early date to provide an adequate supply for testing of all types. The LASL reply was in a different vein. First off, LASL stated that production of the material should be demonstrated. In addition, it stated that light element impurities would have to be kept lower than they are in U-235. A specification of <20 neutrons per kilogram per second was cited. The neutrons would all be from the α, n reaction since there would be no spontaneous neutron emitter like Pu²⁴⁰ present. Based on work done several years ago, it is estimated that our present plutonium has an α, n emission rate of about 1 neutron per gram per second or about 1000 n/Kg/sec. The specific activity of plutonium is much higher than the specific activity of U-233, therefore for the same light element content the U-233 would have a much lower neutron emission rate. It is my recommendation that R. E. Tomlinson investigate the light element purity requirements that would be required to satisfy the LASL limits.

The LASL reply was typical of the complacent attitude we so often see from that source. The hardening possibilities of U-233 were completely by-passed in the LASL reply.

Manager
Weapons Process Engineering

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AE Smith:etb

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