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NOTES ON POGO STAFF MEETING
3 December 1952

1/1991

PLANNING FOR CASTLE

~~RESTRICTED DATA~~

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PRESENT:

L. Aamodt	A. C. Graves	L. Seely
L. Brown	J. Malik	N. Smith
G. Cowan	W. Ogle	R. Spence
A. Embry	H. Plank	B. Watt
G. Felt	F. Reines	R. Wilson

I. MODELS PROPOSED FOR TEST

Operation Castle, the next overseas test, was discussed in general terms at a DIRX meeting on 1 December, at which Bradbury stated that: (a) the operation, originally planned for this fall, will be delayed until Spring, 1954, and (b) the Laboratory will plan on testing the following four models:

Of these models planning for the is the most advanced. Models (2) and (3) are still more or less ideas. The schedule calls for completion of designs by April 1953, completion of construction by the end of 1953, and delivery at the test site by 1 March 1954. Since this constitutes a rather large program for the Laboratory, the feeling is that there can be few changes from this general outline; that is, it will take all the time available to get these bombs designed and fabricated, so it seems unlikely that more gadgets will be added for test.

In addition, Berkeley will test the following two models:

[redacted]

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These we need consider only from the point of view that they will be in the same operation, and their geographical location; we will not be concerned with making measurements on them.

Apparently, [redacted] are destined to be stockpile weapons which we will be proof-testing at Castle. That is, their design will include weapon characteristics (tail fins and ballistic cases for air dropping, etc.) and by the time of Castle there will reputedly be some ready for the stockpile. However, the Castle tests will not be air drops, since apparently the only ballistic case which could be ready and tested would be that for the [redacted] and on this particular model the measurements desired would definitely preclude an air drop test.

II. PROPOSED MEASUREMENTS

Bradbury told Graves that the Laboratory would require no measurements except yield on [redacted] (By yield is meant total energy release, not necessarily broken down into fission and thermonuclear contributions.) Mark agreed with this in essence, adding that T Division would be happy for any other information which could be obtained simply and without complicating the choice of firing sites. They would, for example, be interested in alpha, but not enough to justify putting in extra installations. The same feeling was expressed in connection with [redacted] yield is requested; time between the burning of the [redacted] would be desirable if its measurement is not too difficult, and likewise for alpha.

This leaves most of our experimental effort for the [redacted] test. T Division has said that if measuring alpha on the TX-5 is a major effort, it need not be attempted. However, considering all the other quantities it is desired to measure, one probably might as well measure alpha, and it makes a convenient signal to trigger scopes.

In addition to yield and possibly alpha, then, one wants the time interval between the gadgets and, if we can see how to get it, something about the time history of the burning [redacted] Again, on the latter determination, T Division have said they would like us to attempt it if we believe the measurement has a fair guarantee of success, but if we think it is marginal and it requires exorbitant effort, not to try it.

As for radiation flow studies, their feeling at the moment is that by the time Upshot is over there will be enough information that such measurements will not be necessary on the [redacted] it is not clear they will even want them on the [redacted] Mark would like to wait until after Upshot to answer this question definitely.

There is no very strong feeling about frame camera measurements; they would like to see them made on the and also on any of the other tests where feasible.

Techniques and equipment locations for the proposed measurements are discussed in more detail below.

III. FIRING SITES

If we assume that at least four of the six models mentioned will have yields in the megaton region, the worry promptly arises of in one operation firing several gadgets which can lead to extremely bad fall-out. Presumably, one can take the necessary precautions to protect personnel, but there is also the possibility of having to stop the operation before completion because the islands are so contaminated that no one can work on them. During Ivy there was not any really serious fall-out hazard: the radioactivity did not get down to Parry at all, but only to around Runit; it was possible to work on Runit the day after the shot, and a week later on Aomon. However, Ogle feels we were extremely fortunate and might not be so again.

In addition, there are the considerations of conservation of real estate, suitable locations for instrumentation, weapon assembly and other operational problems.

Because of the nature of the experimental programs, the and Berkeley's gadget must be fired on land. It has been suggested that the be fired on rafts placed either in the lagoon (perhaps on the west reef) or deep ocean some distance from Eniwetok. Bikini has also been under discussion as a site for one or more of the tests.

By "raft", one really means a rather large barge with at least as much room as was in the Mike cab and possibly more, since it must carry the gadget, the EG+G timing station, power supplies, and associated equipment for the _____ etc. Wilson was asked about the possibilities of various crafts. A T-boat would cost about $300,000, he thought, but he would not recommend it because with any winds it will take on water and roll in the sea. He would guess that a barge without fittings would cost something like $35,000 - $50,000, and suggested putting the barge inside an LSD, assembling the bomb there using the fittings available on the LSD, then floating the barge off. A 500-ton barge can go inside an LSD. Or one might use a larger barge, assemble inside the lagoon, and tow it out to sea if desired. He thought that if we are really serious about doing the shots at sea, it would be worth some study to see what types of vessels would be adequate. There may be several types of suitable landing crafts, or perhaps pontoon barges might be considered.

There is a sea mount near the Atoll. As for shooting inside the lagoon, Graves did not think 2 megatons would do anything to the coral in the lagoon. The danger area around Eniwetok Atoll within which ships cannot go is 100 miles out one way, 75 miles out the other. This would be an advantage to staying close to the reef. It would also be quite convenient to float the barge off Parry to work on it (weapon assembly, etc.), then float it across the lagoon and anchor it on the far reef.

Ogle questioned that there would be any appreciable difference in the fall-out from a gadget fired on a raft in the water and one fired as a surface shot on land, except that a few of the induced activities might be different. He thought it a good idea to use rafts but doubted that the width of the lagoon was enough to guarantee no fall-out hazard and thought they might have to be out in the ocean some 50 to 100 miles.

Felt and Graves did not think that fall-out would be serious from a shot in the lagoon, feeling that the situation would be more like an air drop. Felt pointed out there are two things to contend with: first, there is a pattern around the bomb which is essentially round--this is not fall-out but contamination from the base surge or whatever one chooses to call it. The real fall-out is rather unpredictable, but it follows the trade winds; Felt thought that after one is 10 miles away, it does not matter whether he is 15, 20, or 50 miles away.

Again, he felt there would be much less particulate matter thrown up in the air from a shot over water. Spence pointed out that actually one is putting quite a lot of debris in the air, since three per cent of sea water is composed of solids. However, he did not know in what structure this would come down, or whether it would remain suspended in the air.

Ogle was still worried about fall-out, not as a danger to people but from the point of view of having to stop in the middle of an operation because of not being able to work on an island scheduled for the next shot. Felt suggested avoiding this by firing the two bombs which require land shots on two completely different atolls, e.g., Bikini for the Eniwetok for the [redacted] Sampling planes for a Bikini shot could be based on Eniwetok Island (200 miles away), an advantage over basing them on Kwajalein. Bikini is almost due east from Eniwetok. In the spring the winds are all westerly except at the surface, where there is a shear.

Instrumenting a raft shot should not be too difficult for yield measurements only. In view of the present situation on Mike Shot, and since these are also thermonuclear models, it is felt one wants to get both radiochemical and fireball yield. The former can be done with almost any firing site. Felt thought that fireball photography would be no problem on such a shot; pictures could either be taken from a ship using a gyrostabilized platform or from an island if the raft is in the lagoon.

Spence suggested an additional advantage to the barge: this will probably not be the last megaton operation nor the last in which air drops are not feasible, and we will always need land. Another method for firing is obviously in order, and use of barges should at least be tried out. He questioned whether Holloway would agree to the [redacted] being carried around on a raft, but if this is to be a stockpile model, capable of being carried in a plane, it should be all right in a barge.

Everyone liked the idea of using rafts, both to save land and because of the flexibility they afford, particularly if they can be employed in the lagoon. Ogle was still worried about fall-out; Spence did not think one could ever be completely happy about fall-out, but personally did not think there was too much to worry about. Graves thought one could in the future avoid such wind patterns as led to the bad fall-out on Greenhouse Dog and Item.

After further discussion, it was agreed to plan tentatively upon using rafts for the models mentioned, pending Holloway's approval from the point of view of the weapons. Wilson will look further into the raft situation and get more information on dimensions, construction, and other details. There would, incidentally, be no problem in towing a barge from Eniwetok to Bikini, should this become desirable. It might also be possible to put [redacted] on a raft if the experimental requirement remains only for yield.

III. TENTATIVE SHOT SCHEDULE

After considerable discussion, the following schedule appeared reasonable as a basis for planning:

Shot	Site	Suggested Time Interval Between Shots*
[redacted]	Raft or Runit	
		10
	Eberiru	
		7
	Region of Teiteiripucchi	
		7
	Bikini	
		10
	Raft	
		10
	Raft	

* Very tentative--based on Berkeley's having two crews in the field, and J-11's request for 10-day interval between shot sample arrivals at LASL.

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Comments

[redacted] might be fired on a raft; perhaps position in schedule changed to third shot from bottom.

[redacted] a model of this yield (about like Greenhouse-George) will be all right on a high enough tower. Details of the tower, etc., are up to Berkeley. They will do their own radiochemistry. Incidentally, work is in progress for filling up the Eberiru crater.

[redacted] "Region of Teiteiripucchi" is specified, to be made more definite when the measurements program becomes more clear. For example, it may be possible to use Krause's station on Bogon for the time history measurement, in which case we would want, if not land, at least not deep water between zero and that station. It is also not yet clear what installations might be required for special photography.

It appears that a photo tower on Parry could cover, from the point of view of yield, all the above shots at Eniwetok.

IV. FURTHER DISCUSSION OF CASTLE MEASUREMENTS

A. Photography

So far, we are talking of nothing but ball-of-fire photography, but it seems appropriate that some study be given to use of the photographic technique for other measurements which T Division might ask for.

B. Alpha

While the feeling at the moment seems to be that alpha measurements are not absolutely necessary, interest in them has not been completely disclaimed, so it behooves us to investigate ways to get alpha by comparatively simple, remote means. J-13 is looking into the Teller alpha technique, possibilities of telemetering the signal, etc., and will continue these studies.

C. Measurement of Interval Between Two Bombs

Several methods are possibilities:

1. Teller light - a. photocells
   b. Bowen cameras

[redacted] For raft shots on the west side of the lagoon, or for the shot near the Mike crater, J-15's station on Bogallua could be used. This station will accommodate photocells or photomultipliers. Stewart used this technique on Ivy and it worked admirably.

T Division has talked about an accuracy of ± 20% with regard to this determination. Felt stated that a Bowen camera, looking directly with no mirrors or pipes, could get it this well.

2. Gamma Rays

This technique depends upon the possible location of a station. Malik thought the measurement would be possible at 4000 yds and with two scopes.

3. Electromagnetic

The feasibility of this technique has not yet been proved. On Mike Shot, the time interval as measured by C. Cowan was about [redacted] longer than with other techniques; the reason for this is not understood at the moment.

Watt was requested to give some thought to the above methods and present his recommendations.

Planning an experimental program for the implies some calculations on what we might be able to see through the of this model. Members of the group will study the problems involved and further discussions will be held in a week or so.

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