14 September 1971

MEMORANDUM FOR THE RECORD

SUBJECT: Status of Recovery Effort as of 14 September 1971

1. The recovery is proceeding on a schedule to begin the search operation on 3 October and the salvage on 16 October. This memo is to document several of the concerns that have arisen while planning and setting up the operation.

2. The first question was the amount of damage sustained by the recovery vehicle upon water impact. The impact shock was estimated at 2600 g's. A review of the problem by several structural engineers indicated that the vehicle was in one piece; however, the cannister was hydroformed around the payload and ruptured in several places. Many of the main structural elements were beryllium and were probably broken. As a result, there were no structural hard points that were available for lifting so that an enveloping type of pick-up device was needed. Figure I shows the recovery aid. Simplicity of design was a key parameter to assure functioning under adverse conditions.

3. The second problem was locating the impact point to a high degree of accuracy. Several different groups made assessments of the location with widely divergent results at first. Figure II shows the various impact points. Point A is the originally predicted impact point by the Satellite Tracking Center (STC). Point B is the final STC recommended impact point. They had originally recommended point H at 164° west longitude, but on questioning found an error in their calculations. Point B is also the reported location of the drogue chute by the aircraft using Loran C (accuracy of 2-3 miles). Point G is the main chute deployment point (50,000 feet) reported by the aircraft. At that time, however, they were having problems with spurious responses so that point G is discounted. Point C is calculated from Point B using the wind direction aloft. Point D is calculated as a ballistic trajectory from point C. Point E is the impact point calculated by the recovery vehicle contractor using spacecraft ephemeris both before and after RV separation. Point F is our independent Government trajectory calculation. The conclusion is that the search area is as shown, an area 1.5 miles wide by 8 miles long.

4. The third question was the status of the payload. There are materials such as beryllium which are subject to corrosive effects from sea water. Also, the payload was possibly affected by alternate cycles

of wetting and drying. It was decided to maintain the recovered vehicle in sea water until it could be returned to laboratory-controlled conditions. This entailed use of a special shipping container.

5. Throughout the planning of this operation, the support from the Navy has been excellent. Much is new and to be learned on both sides. I have been working on a day-by-day basis with the Deep Submergence System Division (DSSD) in the Pentagon. A meeting was held with the Submarine Development Group I in San Diego to plan the salvage operation. It was agreed that it was highly desirable to have a practice operation. We are furnishing a test recovery vehicle to the Development Group on 16September. A practice mission will be run in 6800 feet off San Diego. If this is successful, the Trieste will proceed to the recovery site. A meeting was held with the Naval Undersea R&D Center (NUC) to review the design of the recovery aid and to evaluate other possible available devices. The other devices were fairly complex with hydraulic or motor actuators. It was concluded that for the application that we had in mind, the proposed design was better. An alternate design, similar to a fishing net with a scoop was also felt to be promising. NUC reviewed the detailed drawings and later (with some pressure from the Navy) agreed to build the recovery-aid and meet the sailing deadline of 16 September for the Trieste.

6. A brief discussion was held with Dr. Fred Spiess, who is heading the search operation with the Desteiguer. A practice search operation was proposed, and he felt that it was probably worthwhile if it could be worked into the schedule at Honolulu, but not mandatory. The parameter that would be evaluated would be the strength of return from the RV. The main unknown is the characteristic of the sea bottom at the recovery site. The bottom contour maps show a flat bottom, but these are based on scattered soundings. The search equipment can locate the navigation aids that are dropped. These are aluminum cylinders one foot in diameter and three feet long, somewhat smaller than an RV. The search is the most difficult task of the operation, in my opinion. If the recovery vehicle can be located, I feel that it can be recovered and the payload will be useful. In view of the uncertainties associated with the search, such as spurious responses from rocks, a RV potentially buried up to 40% and probably covered with a thin layer of silt, the criticality of the search and the time and effort being expended, I strongly recommend that a knowledgeable individual accompany the search ship.

7. To conclude, the operation is proceeding smoothly and everyone connected with it is enthusiastic and feels that there is a reasonable chance of success.

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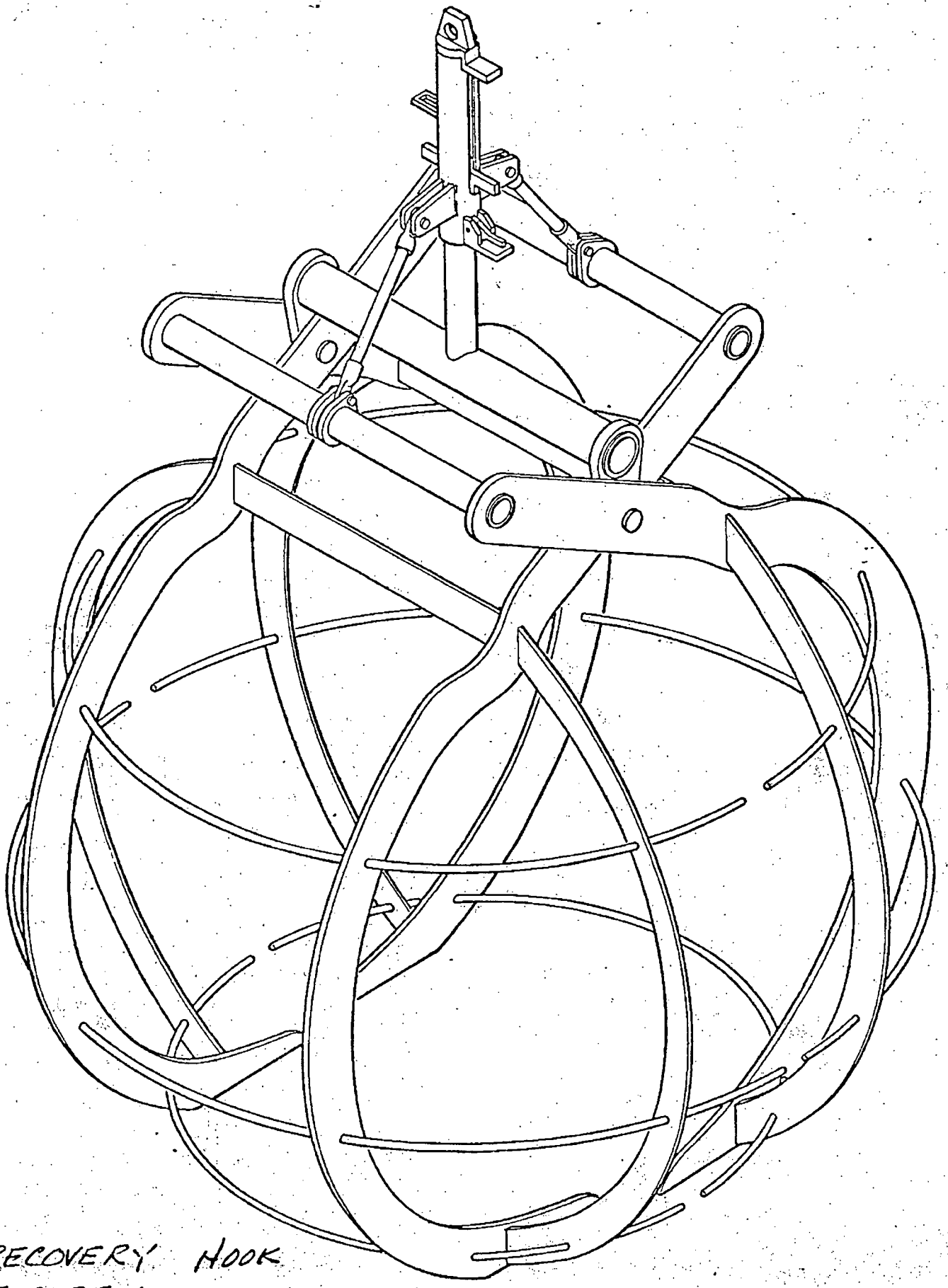

RECOVERY HOOK
FIGURE 1.

FIGURE II

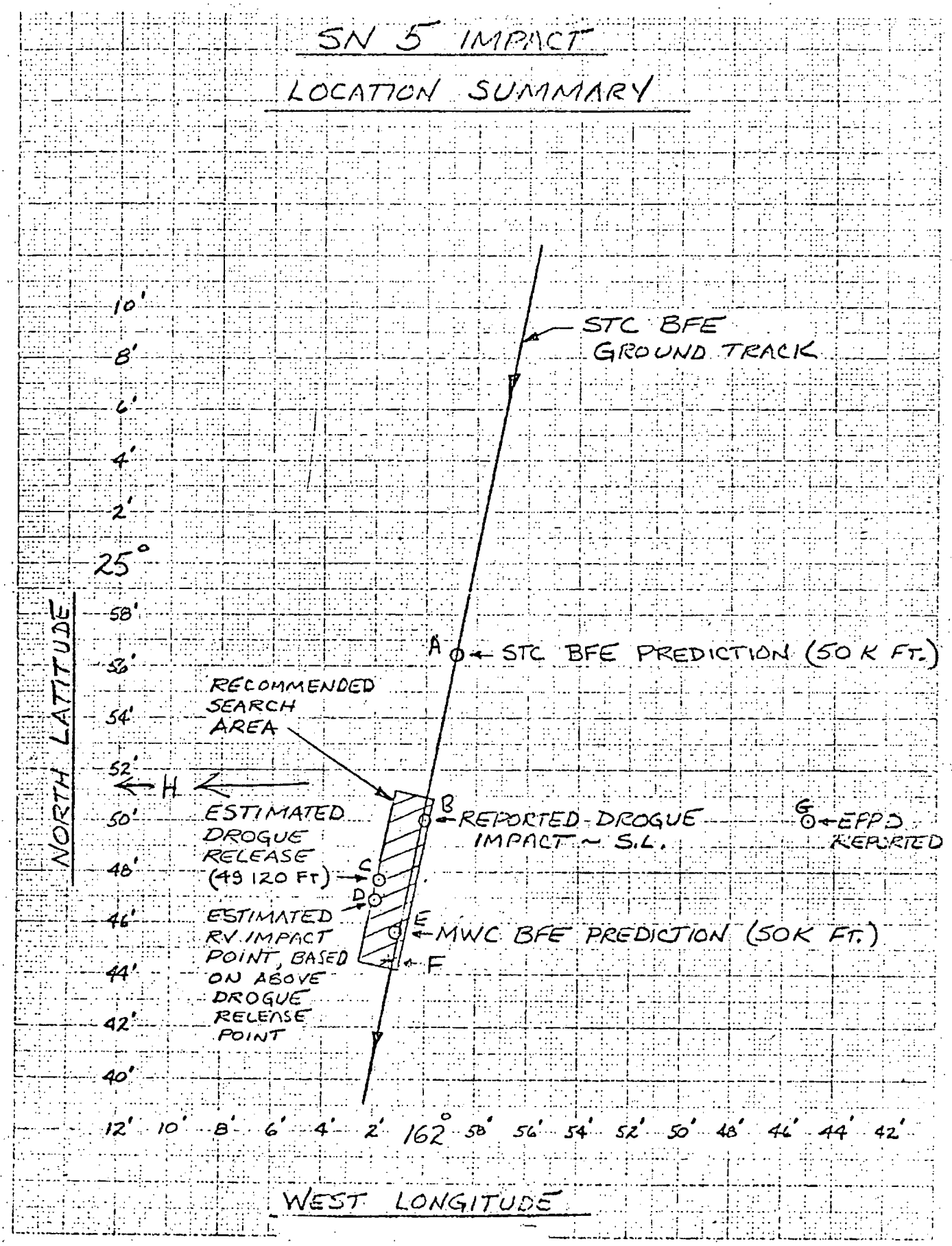

FIGURE 1