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OPTICAL TECHNOLOGY DIVISION
OPTO-MECHANICAL ENGINEERING DEPARTMENT

Memorandum ME 44

TO: Distribution DATE: July 27, 1971

FROM: L.B. Molaskey ✓

SUBJECT: Recovery of RV - #3

A meeting was held, this date at HQS, to formulate plans for the recovery of RV #3 of SVI from the bottom of the ocean off Hawaii.

Attendees

Cdr. E.E. Henifin	U.S. Navy
L/C J.P. Hillock, Jr.	SPO
Maj. R.A. Schow, Jr.	SPO
Mr. R.A. Koch	EK
Mr. D.H. Schoessler	EK
Mr. L.B. Molaskey	SSC
Mr. D.W. Patterson	HQS
[redacted]	HQS
	HQS
	HQS (Security)

The agenda covered is as follows:

AGENDA

1. Re-entry footprint
2. Impact loads and damage assessment
3. Recovery configuration and constraints
4. Equipment requirements
5. Despooling and processing
6. Payload handling
7. Transportation/logistics
8. Organization
9. Security
10. Schedule
11. Cost and funding

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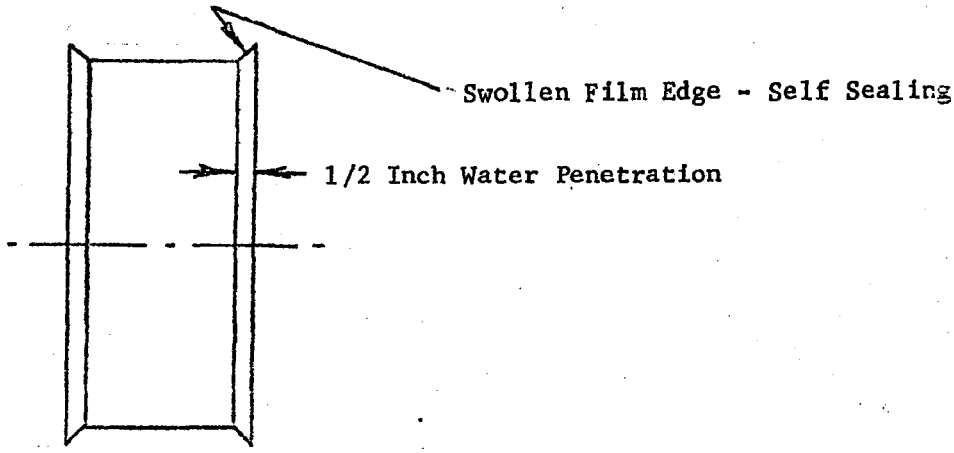
After the proper Hx introduction the meeting convened with an informal discussion of the problem at hand.

Mr. R. Koch (EK) indicated that EK had performed a submersion test of 1414 film. He indicated that after immersion in "simulated Pacific sea water" for five days that a sample 10,000 foot roll tended to be self sealing. He sketched the sample roll as follows:



He said that in his opinion much of the information contained on the film could be recovered if it was maintained wet and dark until processed.

Following the above agenda the meeting discussion addressed who will be responsible for the various items and how and on what schedule they should be accomplished.

Item #1 - Re-entry Footprint

SPO will be responsible for identifying, as accurately as possible, the impact point. Col. Hillock agreed to provide whatever information was available and to investigate, through the recovery force, what additional information was available: i.e., flight recorder information; impact time information; visual evidence, etc. It was noted that the RV entered the water at between 400 to 500 feet per second impacting with the RV spin axis perpendicular to the water (nose on). The heat shield was in place. Speculation is that the ballast between the heat shield and the pressure canister (24# of lead) tore out through the heat shield om impact. Previous rumor that the RV surfaced and was sighted after impact was indicated to be erroneous. There is, however, indication that there was evidence of dye from the "dye marker" as well as bubbles evident on the surface in the area of suspected impact. These observations will be checked out by SPO with the recovery team. Cdr. Henifin (U.S. Navy) agreed to provide information as to the sea currents and the nature

of the bottom in a 10 mile square area at the impact point. He agreed to provide data as to the drift of the RV in sinking to the bottom. He needs, however, estimated sink rates.

Item #2 - Impact Loads and Damage Assessment

MWC and SSC will be responsible for assessing the damage to the TU/RV on impact. Preliminary estimates by MWC (from [redacted] via telecon on 7-22-71 were that the bucket saw 20-25G shock when the parachute deployed which caused the chute attachments to fail and that the RV entered the water, as indicated earlier, at 400 to 500 feet per second. Estimates of 3000 G's on impact were mentioned).

From the estimates of damage, failure modes, etc. SSC and MWC are asked to predict the decent rate through the ocean. Of special interest is the velocity expected at the bottom which is estimated to be 14,400 feet. The above data will be used by the Navy to estimate the drift during decent and the effects of impact on the bottom. (Is it likely to be imbeded in the mud?)

Item #3 - Recovery Configuration and Constraints

Extended discussion concerning the configuration and capability of the search and recovery requipment revealed:

- The RV package will be searched for and hopefully located by a commercial contractor search vessel commanded by Dr. F.N. Spiess. The technique will be for the search vessel to tow a sensor "fish" on a 30,000 ft. cable. The sensor employs high resolution side looking sonar having a range of 1000 feet transverse to the towing direction. The RV package will be located and its location marked by some sort of transducer anchored to the ocean bottom adjacent to the package. The recovery vehicle "The Trieste II" will be positioned at the surface above the transducer and will decend, homing in on the transducer, to the bottom. The Trieste has a lift capability of over 2000 pounds. It is rigged with a wench and hook arrangement which is used to lift the payload. A mechanical manipulator with six degrees of freedom having a grip strength of 3000 pounds will be used to attach the payload to the hook or suitable lifting apparatus.

Various photographic and television instrumentation will record the underwater operation. There is also a view port in the 7 ft. diameter spherical operating chamber for the three man crew to observe and control the operation.

Item #4 - Equipment Requirements

When the unit is located on the bottom by the Trieste the plan is to somehow attach a hook to the RV. SSC and MWC are to investigate the probable configuration of the unit on the bottom and devise a means to attach the hook.

This operation is performed by use of the manipulator to roll the unit out of the mud and attach the hook. The Trieste then starts up while playing out the cable until it is about 120 feet off the bottom. Then both proceed to the surface with the RV suspended from the 120 foot depth below the Trieste. At this point divers will be sent down with a cargo net which is lined with black canvass. The illumination levels at this depth must be investigated to preclude exposure of the material (SSC is responsible).

The unit will be wrapped with the canvass and secured light tight by the divers. A separate wench cable from the support ship will be attached, the Trieste's cable detached and the package hoisted to the support ship.

A suitable container immersed or full of sea water will receive the entire package, net and all. The container will be sealed and filled with sea water and transported to Hawaii for transfer to an aircraft for the flight to Rochester.

SSC has been asked to investigate the availability of suitable containers (in parallel with SPO and MWC).

Item #5

At Rochester the unit will be opened in the dark, the structure removed by whatever means necessary while maintaining the unit wet. A hole will be bored through the shaft center parallel to the rotation axis and a rod inserted to provide an axle about which to rotate the spools. The film will be removed by hand and transferred directly to processing in 2,000 to 3,000 foot lengths. One side will be handled at a time.

EK is responsible for all of the tools and equipment required in the despooling operation. SSC will be asked to consult on possible schemes and methods of removing the hardware from around the film, and in attaching the axle.

Item # 6 - Payload Handling

Most of the handling of the recovery package was discussed above. Considerable discussion about protecting the unit from exposure to light and from drying out was held. There are still questionable areas concerning -

a. The use of bright light to find the package on the ocean bottom.

b. The use of light to take pictures of the recovery operation and and hardware configuration.

c. The illumination level at the 120 foot transfer depth.

No other payload handling problems are anticipated.

Item 7 - Transportation and Logistics

All transportation and logistics will be handled by SPO working with the Navy and HQS.

Item #8 - Organization

There was no "official" organization published or directed at this time. However, as noted under the other items above, responsibilities were defined. The Navy will be responsible for the actual recovery operation. It was indicated that it would be helpful to have a responsible individual from each involved organization identified. The contractors were asked to work through their respective customers in all data transmittal. The responsible individuals are:

HQS	D. Patterson [redacted]
SPO	L/C J.P. Hillock, Jr.
EK	D. Schoessler
MWC	[redacted]
SSC	L.B. Molaskey
Navy	Cdr. E.E. Henifin

Item #9 - Security

In general the security plan for this operation will be to brief as few new people as possible and only to level necessary for them to perform their function.

Several areas where full briefing will be required are:

a. The Trieste operators (3).

b. The divers who enclose the payload in the net (4).

c. One photo processor who develops the hardware photos from the "fish".

d. The commander of the search vehicle (Dr. F.N. Spiess).

e. Several Navy personnel.

Item #10 - Schedule

This meeting affectively started the operation rolling. It is estimated that the modifications to the search vehicle will start by August 16th with the search to start five days later. It is estimated that the recovery

will take 10 days on station. Two days will be required to return to port and transfer to the aircraft. Despooling is estimated to start in mid September.

Item #11 - Cost and Funding

It is estimated that the subcontract for the search operation (a civilian contractor) will be between 75 to 100K.

Each of the contractors will submit proposals, prepared in parallel with the effort, defining the cost, schedule, and tasks involved. The proposals will be submitted to the respective customers.

L.B. Molaskey 7-27-71

LBM/cj

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