



*Office Memorandum* • UNITED STATES GOVERNMENT

TO : Secretary of the Navy

DATE: 27 OCT 1958

FROM : Chief of Naval Personnel

SUBJECT: Permission to use human subjects to conduct shipboard tests with safety-type hydraulic fluids; request for

1. The Chief, Bureau of Ships has requested the Chief, Bureau of Medicine and Surgery to obtain authority to utilize a nuclear powered submarine and its crew in conducting dynamic tests of safety-type hydraulic fluids. Arrangements have been made for SWORDFISH (SEN 579) to provide necessary services during a 4½-day submerged operation in early November and for LCDR H. D. Baldrige, MSC, USN of the NMRI, Bethesda to administer the tests. This information was obtained from the BuShips coordinator for the proposed tests.
2. The reason for the request lies in the fact that the material to be used is a triaryl phosphate type compound and is toxic when certain atmospheric concentrations are reached. The Chief, Bureau of Medicine and Surgery states in the basic letter that preliminary static tests indicate toxic proportions will not be approached during the underway test and that proposed tests will probably not run more than one to two days.
3. The request is forwarded as a matter requiring your approval.
4. A recommended reply for your signature, approving the request, is attached.

Very respectfully,



Pers-A212-mh

1000 058

FIRST ENDORSEMENT on BUMED ltr BuMed-714E-oj of 7 Oct 1958

From: Chief of Naval Personnel  
To: Secretary of the Navy

Subj: Permission to use human subjects to conduct shipboard tests  
with safety-type hydraulic fluids; request for

1. Forwarded, as a matter requiring approval of the Secretary.
2. Pursuant to paragraph 5 of enclosure (1), LCDR H. D. BALDRIDGE, MSC, USN of the Naval Medical Research Institute, Bethesda has been nominated by separate correspondence to conduct subject tests. Arrangements have been completed to commence tests in SWORDFISH(SSN-579) in early November for a period of about 4½ days.



H. D. BALDRIDGE

Copy to:  
BuMed (714E)  
BuShips (346)  
BuOrd - Sp006  
CO, NMRI



DEPARTMENT OF THE NAVY  
BUREAU OF MEDICINE AND SURGERY  
WASHINGTON 25, D. C.

IN REPLY REFER TO

BUMED-714E-oj  
7 Oct 1958

From: Chief, Bureau of Medicine and Surgery  
To: Secretary of the Navy  
Via: Chief of Naval Personnel

Subj: Permission to use human subjects to conduct shipboard tests with safety-type hydraulic fluids; request for

Ref: (a) ManMedDep Chap. 1, Para. 17

Encl: (1) BuShips itr All/NS 041-016(342) Ser 342-491 of 25 Sep 1958

1. By enclosure (1), this Bureau was requested to obtain clearances necessary for the proposed shipboard tests.

2. The material to be used is a triaryl phosphate type compound and is estimated to be toxic when atmospheric concentrations are greater than the following:

0.6 ppm	30 days
0.3 ppm	60 days
0.06 ppm	90 days

On the basis of preliminary tests run under static conditions, it is believed that concentrations will not approach the highest level of 0.6 ppm suggested for 30 day exposure. In addition, it is anticipated that the proposed test will not run more than one to two days. A dynamic test aboard an operating nuclear-powered submarine will provide data which will be useful in providing firmer information for design parameters needed by the Bureau of Ships.

3. It is the opinion of this Bureau that the proposed tests will not create any undue hazard to the health or life of personnel aboard the submarine. It is therefore requested that approval be given in accordance with reference (a).

O. D. YARBROUGH  
By direction

Copy to:  
BUSHIPS (342)  
BUORD-Sp 006  
CO NMRI



DEPARTMENT OF THE NAVY  
BUREAU OF SHIPS  
WASHINGTON 25, D. C.

111/NS  
Ser 342  
25 SEP 1958

From: Chief, Bureau of Ships  
To: Chief, Bureau of Medicine and Surgery

Subj: Shipboard tests of safety-type hydraulic fluids

Ref: (a) SPEC MIL-H-19457 (SHIPS)

Encl: (1) Test Plan

1. In recent correspondence, the Bureau of Medicine and Surgery commented on the toxicological aspects of the use of safety-type hydraulic fluids conforming to reference (a) aboard submarines. Estimates were furnished as to the maximum concentration of such chemicals in the air which could be tolerated without injury.

2. Because of the engineering advantages to be derived aboard submarines is considered very desirable. Based on experience aboard carriers, it is considered quite probable that the actual amount of fluid vaporized into the submarine environment can be kept below the limits previously formulated. However, before actual submarine installations are made, it is desired to verify this with data obtained under actual conditions.

3. This matter was discussed by personnel from the Bureau of Medicine and Surgery and the Bureau of Ships at a conference on 12 September 1958. Enclosure (1) is the test plan developed at that conference.

4. A request is being made to Commander, Submarine Force, Atlantic Fleet, for permission to conduct these tests aboard an operating nuclear-powered submarine. Tentatively, it appears possible that these tests can be scheduled about mid-October. More definite information concerning schedules will be provided as soon as possible.

5. At the conference mentioned in paragraph 3, it was stated that the Bureau of Medicine and Surgery might be able to make personnel available for the conduct of the test work. It is requested that the availability of such personnel be confirmed.

ENCL (1) - BUMED ltr 714E-cj of 7 Oct 1958

o. Considerable toxicological data are available on these phosphate ester fluids. In view of the relatively short duration of the planned submarine test and the low level of exposure, it is believed that the exposed personnel on the submarine will not be affected in any way. The Bureau of Medicine and Surgery is requested to arrange for the clearance necessary for such a shipboard test.



A. E. KRAPP  
By direction

- Copy to:  
103  
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341  
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342 (10 copies)

Prepared by M. Alpert, Ext 6125 62322  
Typed by W. Blazek, 9/18/58

## TEST PLAN

1. Purpose. Submarine hydraulic systems may leak during normal operations. This series of tests is intended to yield data indicating the extent of air contamination by safety-type hydraulic fluids resulting from such leaks.

2. Test work. The following observations will be made:

a. Visual. The hydraulic system (now filled with petroleum-based fluid) will be examined for leaks. Observations will be made as to the number of leaks, their location, approximate rate and nature (fast or slow drip, spray, aerosol, etc.), and whether the fluid falls on heated surfaces. Notes will be taken whether significant amounts of leaking fluid are not caught in drip pans, and whether water-sealed drip pans are feasible in all locations (because of space limitations).

b. Blank values. All samples will be taken when no other tests are under way which will result in the introduction of interfering contaminants into the atmosphere. All series (2c, 2d, and 2e below) will be preceded by the taking of blank or control samples at the same sampling points used in the later tests.

c. Unsealed drip pans. A duplicate series of drip pan drip pans will be constructed and placed as near as possible to the drip pans in use for catching petroleum-based fluid. Safety-type fluid will be poured into the duplicate pans. Air samples will be taken at increasing distances from the pans. Also, other sets of air samples will be taken after various intervals of time in an attempt to obtain equilibrium data.

d. Water-sealed drip pans. In situations such as this, the conventional recommendation is to pour water into the drip pan. This provides a water seal, reducing air contamination markedly. Thus an additional series is included in which all conditions will be the same as in 2c, except that water will also be poured into all drip pans (wherever space is available).

e. "Hot-drip" All safety-type hydraulic fluid will be removed to closed containers. Then, in one location, safety-type hydraulic fluid will be dripped slowly on to a hot surface (ca 300°F.) for several hours. The run-off will be caught in an unsealed drip pan. Air samples will be taken throughout the submarine during that period.

Enclosure (1) to BUSHIPS Ser 142-491

3. Test personnel. Tentatively, arrangements have been made for these tests to be conducted by two men to be designated by the Bureau of Medicine and Surgery.

4. Methodology. The analytical techniques will be basically the same as used in laboratory inhalation studies currently being planned at the Naval Medical Research Institute.

Enclosure (1) to BUSHIPS Ser 342-491