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TECHNICAL INSPECTION REPORT

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By Authority of JOINT CHIEFS OF STAFF JCS 1795/36 DATED 15 APRIL 1949
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(6) OPERATION CROSSROADS.

U.S.S. PARCHE (SS384).

367472

TEST BAKER [U]. (8)

FILE COPY

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Director
Defense Atomic Support Agency
Washington, D. C. 20301

(10) C. L. Gaasterland.
(11) 1947,
(12) 35p.
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OPERATION CROSSROADS

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BUREAU OF SHIPS GROUP

TECHNICAL INSPECTION REPORT

Director
Defense Atomic Support Agency
Washington, D. C. 20301

SUBMITTED:

C. L. Gaasterland,
Commander, U.S.N.

APPROVED:

F. X. Forest,
Captain, U.S.N.

USS PARCHE (SS384)

SECRET

Page 1 of 35 Pages

CONFIDENTIAL

TABLE OF CONTENTS

U.S.S. PARCHE (SS384)

SHIP CHARACTERISTICS

Building Yard: Portsmouth Naval Shipyard.

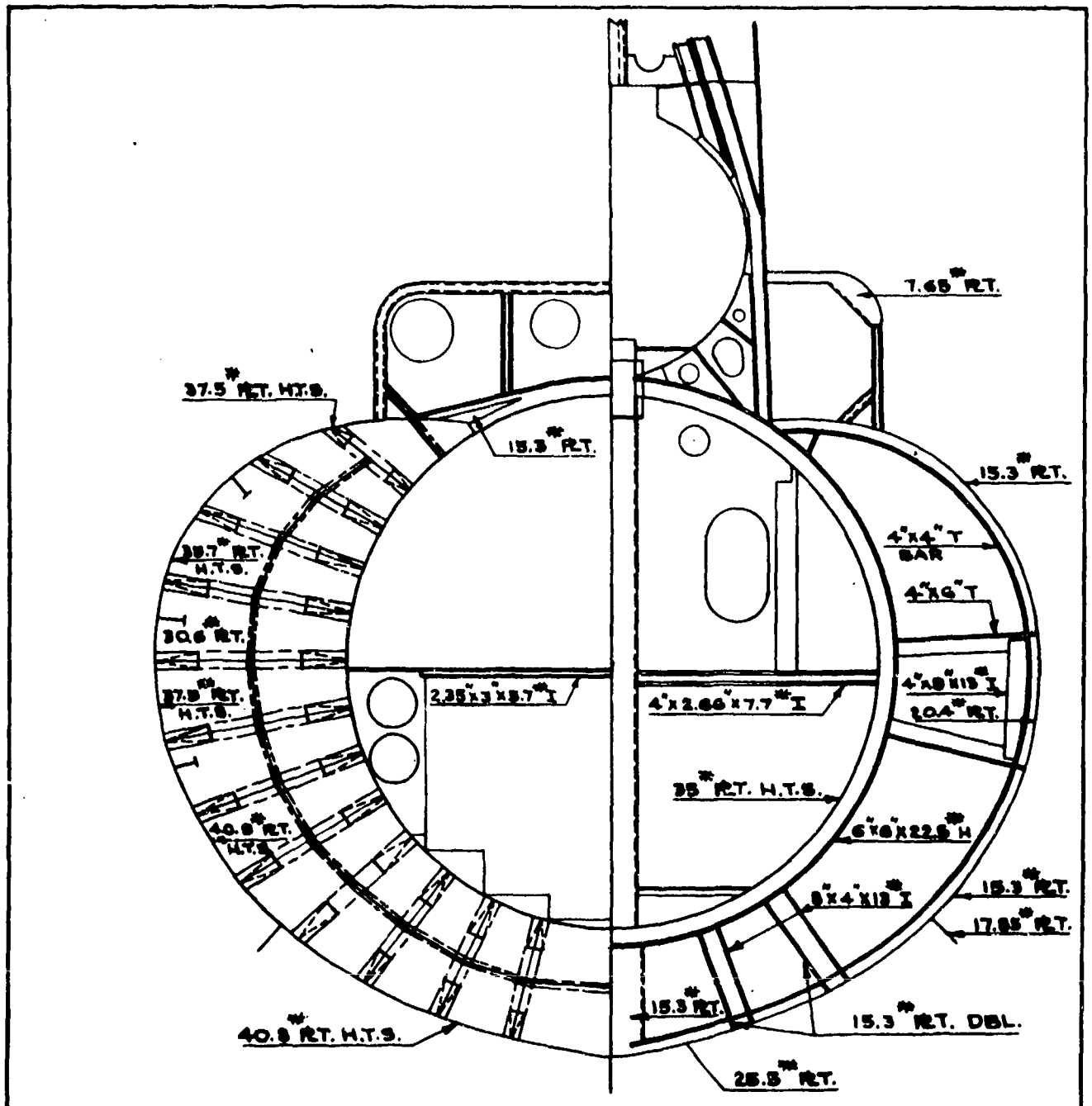
Commissioned: 20 November 1943.

HULL

Heavy Hull Construction.
Length Overall: 311 feet 8 inches.
Length (between perpendiculars): 307 feet 0 1/2 inches.
Beam (extreme): 27 feet 3 1/2 inches.
Beam (molded): 27 feet 1 3/4 inches.
Height (lowest point of keel to top of periscope supports): 47 feet 3 inches.
Drafts (at time of test): Fwd. 16 feet 3 inches.
Aft. 16 feet 4 inches.
Standard Displacement: 1525 tons.
Displacement (at time of test): 1966 tons.

MAIN PROPULSION PLANT

Main Engines: Four Fairbanks-Morse, 10 cylinder, Type 38D8.
Auxiliary Engine: Fairbanks-Morse, 7 cylinder, Type 38D5.
Main Motors and Generators: Elliott.
Main Storage Battery: Exide.
Main Controls: Westinghouse.
Reduction Gears: Westinghouse.
Diesel Electric Drive.



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TEST B

TECHNICAL INSPECTION REPORT

OVERALL SUMMARY

I. Target Condition After Test.

(a) Drafts after test; list; general areas of flo ding, sources.

Th PARCHE was on the surface for test B at a range approximately 1600 yards from the center of the burst. Her drafts before and after the test were the same, 16' - 3'' forward and 16' - 4'' aft. There was no flooding.

(b) Structural damage.

There is no structural damage.

(c) Other damage.

All machinery and equipment tested and operable as before test.

II. Forces Evidenced and Effects Noted.

(a) Heat.

There is no evidence of heat.

(b) Fires and explosions.

There is no evidence of fire or explosions.

(c) Shock.

No evidence of shock of any magnitude was noted. Loose gear inside the ship was not disarranged.

(d) Pressure.

The 'Coordinators Report on Air Blast and Water Shock for tests A and B' dated 27 September 1946 indicates the peak air pressure was approximately 2.5 lbs. per square inch. Elastic hull distortion in the torpedo rooms, measured at four stations, was not greater than 0.015 inches.

(e) Any effects peculiar to the atom bomb.

The only effect noted peculiar to the atom bomb is radioactivity. The PARCHE, along with the other submarine on the surface, showed more radioactivity than those submerged, and was above the radiological tolerance of 0.1R/24 hours inside the pressure hull.

III. Effects of Damage.

(a) Effect on machinery, electrical and ship control.

None.

(b) Effect on gunnery and fire control.

None.

(c) Effect on watertight integrity and stability.

None.

(d) Effect on personnel and habitability.

Aside from radioactivity, no peculiar effect was noted.

(e) Total effect on fighting efficiency.

Test B had no effect on fighting efficiency from a material standpoint.

IV. General Summary of Observers' Impressions and Conclusions.

Except for the effects of radioactivity, a modern submarine would be unaffected by an atom bomb under conditions similar to those of the PARCHE in test B. For general views of the PARCHE after the test, see photographs on pages

V. Preliminary Recommendations.

None.

TECHNICAL INSPECTION REPORT

SECTION I - HULL

GENERAL SUMMARY OF HULL DAMAGE

I. Target Condition After Test.

(a) Drafts after test; list; general areas of flooding, sources.

The PARCHE was on the surface for test B. Her drafts before and after the test were the same 16' - 3" forward and 16' - 4" aft. There was no flooding.

(b) Structural damage.

There is no structural damage.

(c) Other damage.

As far as hull material is concerned there is no damage.

II. Forces Evidenced and Effects Noted.

(a) Heat.

No evidence.

(b) Fires and explosions.

No evidence.

(c) Shock.

Any shock was negligible. Loose eggs and glassware were not broken.

(d) Pressure.

The "Coordinator's Report on Air Blast and Water Shock for Tests Able and Baker" dated 27 September 1946 indicates the peak air pressure was approximately 2.5 lbs. per square inch. Elastic hull distortion in the torpedo rooms, measured at four stations, was not greated than 0.015 inches.

(e) Effects apparently peculiar to the atom bomb.

Aside from radioactivity, no peculiar effects were noted.

III. Effects of Damage.

(a) Effect on machinery,electrical, and ship control.

None insofar as hull material is concerned.

(b) Effect on gunnery and fire control.

None insofar as hull material is concerned.

(c) Effect on watertight integrity and stability.

None.

(d) Effect on personnel and habitability.

None except for possible radiological effects.

(e) Total effect on fighting efficiency.

From a material standpoint, no reduction in fighting efficiency occured.

IV. General Summary of Observers' Impressions and Conclusions.

From a material standpoint a submarine on the surface at the distance of the PARCHE from an atom bomb explosion such as that of Test Baker is in no danger.

V. Preliminary General or Specific Recommendations of the Inspecting Group.

None.

DETAILED DESCRIPTION OF HULL DAMAGE

A. General Description of Hull Damage.

No damage.

B. Superstructure.

No damage.

C. Turrets, Guns and Directors.

No damage.

D. Torpedo Mounts, Depth Charge Gear.

No damage.

E. Weather Deck.

No damage.

F. Exterior Hull.

No damage.

G. Interior Compartments (above w.1.).

No damage.

H. Armor Decks and Miscellaneous Armor.

Not applicable.

I. Interior Compartments (below w.1.)

No damage.

J. Underwater Hull.

No damage.

K. Tanks.

No damage.

L. Flooding.

None.

M. Ventilation.

No damage.

N. Ship control.

No damage.

O. Fire Control.

No damage.

P. Ammunition Behavior.

No damage.

Q. Ammunition Handling.

No damage.

R. Strength.

No damage.

S. Miscellaneous.

No comment.

T. Coverings.

No damage.

U. Welding and Rivetting.

No damage.

TECHNICAL INSPECTION REPORT

SECTION II - MACHINERY

GENERAL SUMMARY OF MACHINERY DAMAGE -

I. Target Condition After Test.

(a) Drafts after test; list; general areas of flooding, sources.

The PARCHE was on the surface for Test Baker. Draft and list were normal and the same as before the test. No. flooding occurred.

(b) Structural damage.

None observed.

(c) Other damage.

All machinery undamaged, tested and operable as before test.

II. Forces Evidenced and Effects Noted.

(a) Heat.

No evidence of unusual heat was observed.

(b) Fires and explosions.

No evidence of fires nor explosions were observed.

(c) Shock.

No evidence of shock of any magnitude was noted. Loose gear inside ship was not disarranged.

(d) Pressure.

No evidence of pressure was noted.

(e) Any effects apparently peculiar to the atom bomb.

The only effect noted peculiar to the atom bomb is radioactivity. The PARCHE along with the other submarine on the surface showed more radioactivity, retained same longer than those submerged, and was above the radiological tolerance of 0.1R/24 hours inside the pressure hull.

III. Effects of Damage.

(a) Effect on machinery and ship control.

None. Undamaged.

(b) Effect on gunnery and fire control.

None. Undamaged.

(c) Effect on watertight integrity and stability.

None. Unaffected.

(d) Effect on personnel and habitability.

None other than possible radiological effects.

(e) Total effect on fighting efficiency.

Test Baker had no effect on fighting efficiency from a material and machinery standpoint.

IV. General Summary of Observers' Impressions and Conclusions.

Except for the effects of radioactivity, a modern submarine would be unaffected by an atom bomb under conditions similar to those in Test Baker.

V. Preliminary General or Specific Recommendations of the Inspecting Group.

No comment.

DETAILED DESCRIPTION OF MACHINERY DAMAGE

A. General Description of Machinery Damage.

(a) Overall condition.

Above radiological tolerance for continuous exposure inside and topside but otherwise undamaged.

(b) Areas of major damage.

Undamaged.

(c) Primary cause of damage in each area of major damage.

Undamaged.

(d) Effect of target test on overall operation of machinery plant.

None. All machinery operable, tested and in same condition as before target test.

B. Boilers.

Not applicable.

C. Blowers.

Not applicable.

D. Fuel Oil Equipment.

No damage.

E. Boiler Feedwater Equipment.

Not applicable.

F. Main Propulsion Machinery.

No damage.

G. Reduction Gears.

No damage.

H. Shafting and Bearings.

No damage.

I. Lubrication System.

No damage.

J. Condensers and Air Ejectors.

Not applicable.

K. Pumps.

No damage.

L. Auxiliary Generators (Turbines and Gears).

Discussed under Item F.

M. Propellers.

No damage.

N. Distilling Plant.

No damage.

O. Refrigeration Plant.

No damage.

P. Winches, Windlasses, and Capstans.

No damage.

Q. Steering Engine.

No damage.

R. Elevators, Ammunition hoists, etc.

Not applicable.

S. Ventilation (Machinery).

No damage.

T. Compressed air plant.

No damage.

U. Diesels (Generators and Boats.).

Not applicable. See Item F.

V. Piping Systems.

No damage.

W. Hydraulic System.

No damage.

X. Navigational Instruments

No damage.

Y. Periscopes.

No damage.

Z. Radar and Sonar.

No damage.

AA. Miscellaneous.

None.

TECHNICAL INSPECTION REPORT

SECTION III - ELECTRICAL

GENERAL SUMMARY OF ELECTRICAL DAMAGE

I. Target Condition After Test.

(a) Drafts after test; list; general areas of flooding, source.

Not observed.

(b) Structural damage.

Not observed.

(c) Other damage.

No electrical equipment was damaged or inoperable due to the test.

II. Forces Evident and Effects Noted.

(a) Heat.

No evidence.

(b) Fires and Explosions.

None.

(c) Shock.

There was no evidence of shock damage.

(d) Pressure.

There was no evidence of pressure damage.

(e) Any effects apparently peculiar to the atom bomb.

None, other than radioactivity.

III. Effects of Damage.

(a) Effect on propulsion and ship control.

None.

(b) Effect on gunnery and fire control.

None.

(c) Effect on watertight integrity and stability.

None.

(d) Effect on personnel and habitability.

None except for possible radiological effects.

(e) Effect on fighting efficiency.

None.

IV. General Summary of Observers' Impressions and Conclusions.

The electrical equipment in this ship was not damaged in Test Baker. It is considered that even though on the surface, this ship was outside the range of damage by the atom bomb.

V. Preliminary or Specific Recommendations of the Inspecting Group.

None.

DETAILED DESCRIPTION OF ELECTRICAL DAMAGE

A. General Description of Electrical Damage.

(a) Overall condition.

No damage to electrical equipment. Various moisture grounds were found when the ship was reboarded.

(b) Areas of major damage.

None.

(c) Primary causes of damage in each area of major damage.

None.

(d) Effect of target test on overall operation of electric plant.

The operability of the electric plant was in no way impaired, either directly or indirectly, by the atom bomb.

(e) Types of equipment most affected.

None.

B. Electric Propulsion Rotating Equipment.

No damage.

C. Electric Propulsion Control Equipment.

No damage.

D. Generators - Ship's Service.

Not applicable.

E. Generators - Emergency

Not applicable.

F. Switchboards, Distribution and Transfer Panels.

No damage.

G. Wiring, Wiring Equipment and Wireways.

No damage.

H. Transformers.

No damage.

I. Submarine Propelling Batteries.

No damage. Batteries were fully charged prior to the test. The after battery was used to supply power for electronic equipment during the test. Analysis of electrolyte samples after test by Pearl Harbor Naval Shipyard revealed no significant changes attributable to the atom bomb.

J. Portable Batteries.

Not applicable.

K. Motors, Motor Generator Sets and Motor Controllers.

No damage.

L. Lighting Equipment.

No damage.

M. Searchlights.

No damage.

N. Degaussing Equipment.

Not applicable.

O. Gyro Compass Equipment.

No damage.

P. Sound Powered Telephones.

No damage.

Q. Ship's Service Telephones.

Not applicable.

R. Announcing Systems.

No damage.

S. Telegraphs.

No damage.

T. Indicating Systems.

No damage.

U. I. C. and A. C. O. Switchboards.

No damage.

V. F. C. Switchboards.

No damage.

W. Miscellaneous.

The two timing relays installed on the propulsion control cubicle to de-energize the after auxiliary power circuit breaker functioned correctly and were not damaged. The electric power equipment placed in operation immediately prior to the test remained in operation until de-energized by the timing relays after the blast.

SECTION IV

PHOTOGRAPHS

TEST BAKER

AB-CR-227-243-38. General view from ahead.

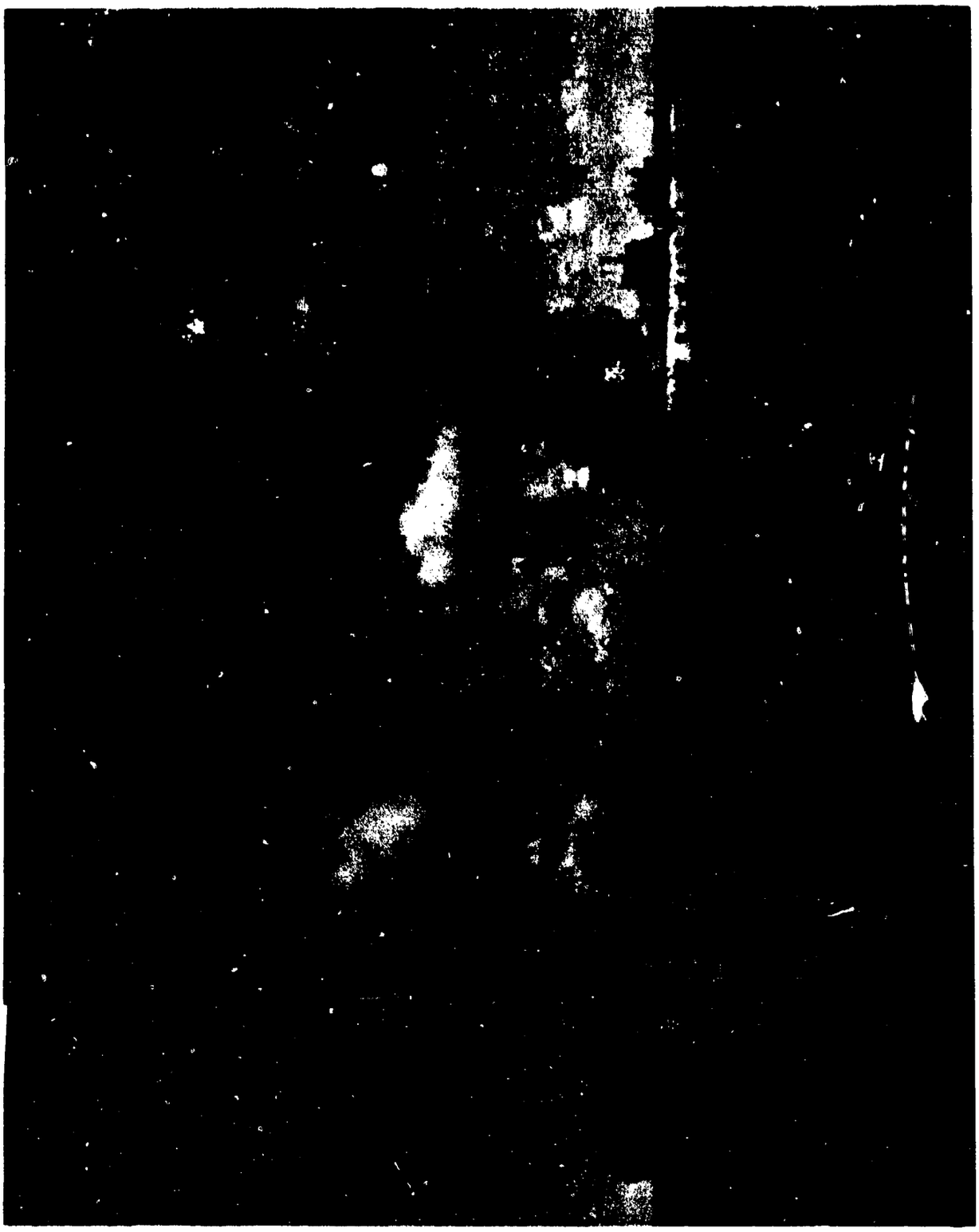
AB-CR-227-243-36. General view from starboard beam.

AB-CR-227-243-35. General view from starboard quarter.

AB-CR-227-243-34. General view from astern.

AB-CR-227-243-33. Genaral view from port quarter.

AB-CR-227-243-40. General view from port beam.



AE CR-227-243-39. General view from port bow.

AB-CR-227-243-37. General view from starboard bow.

APPENDIX

COMMANDING OFFICER'S REPORT

TEST BAKER

U.S.S. PARCHE (SS384)

Report No. 11

Test Baker

PART A

GENERAL SUMMARY

I. Target Condition after test.

(a) No change in draft or list. No flooding.

(b) No structural damage to superstructure, pressure hull, ballast tanks, or compartments.

(c) All machinery and equipment was completely operable upon reboarding.

(d) There was no evidence of heat or fire. The commanding officer does not feel qualified to estimate casualties to personnel from radioactivity.

II. Forces evidenced and effects noted.

(a) No evidence of heat.

(b) No fires or explosions occurred aboard.

(c) No evidence of shock.

(d) No effects to material peculiar to the atom bomb other than radioactivity topside.

III. Results of Test on Target.

(a) No effect on propulsion and ship control.

(b) No effect on gunnery and fire control.

(c) No effect on water-tight integrity and stability.

(d) The effect on personnel and habitability is unknown to this command.

(e) Upon reboarding on 6 August 1946, the fighting efficiency of the PARCHE was unimpaired. All fire control equipment, ordnance and gunnery installations, propulsion, and ship control equipment were in good fighting condition.

IV. General Summary.

The PARCHE was 1500 yards from the center of the explosion during test "Baker". It is the commanding officer's impression that a submarine in time of war could have completed her mission if an atomic bomb were detonated under the same depth-distance condition that existed during test "Baker". At 1500 yards range, emergency maneuvering would be required to avoid the "cloud" and "rain" resulting from the burst. However if casualties to personnel resulted, it is believed that only the bridge watch would be effected.

V. Recommendations.

For future design it is recommended that all wood on the main deck topside be eliminated. It is further recommended that the width and length of metal decking be severely curtailed - approximating British design. Any wooden decking on the bridge structure should be of a portable nature, easily jettisoned. It is suggested that the abbreviated metal main deck have a definite camber and ample tumble-home to insure free drainage.

The bridge superstructure and conning tower fairwater should be simplified and reduced in size. There should be no surface

or pocket which normal upkeep routines cannot reach. Single coats of paint and lack of rust definitely assist decontamination.

The present design of the pressure hull, torpedo tubes, gunnery and fire control instruments, and all below decks machinery is considered excellent.

It would be beneficial to eliminate the scuppers where the upper edges of ballast tanks join the pressure hull. A plastic protective coating with a smooth glazed surface is highly preferable to bitumastic.

Conclusions.

With the above minor alterations to the submarine superstructure, coupled with high speed, and maneuverability a submarine in any future atomic war would have a better chance to avoid an atomic bomb at sea or combat radioactive contamination in port.

PART C

INSPECTION REPORT

Section I - Hull

Section II - Machinery

Section III - Electrical

Section IV - Electronics

There was no damage to any item in any of the above sections.

Defense Special Weapons Agency
6801 Telegraph Road
Alexandria, Virginia 22310-3398

TRC

18 April 1997

MEMORANDUM FOR DEFENSE TECHNICAL INFORMATION CENTER
ATTENTION: OMI/Mr. William Bush (Security)

SUBJECT: Declassification of Reports

The Defense Special Weapons Agency has declassified the following reports:

AD-366588	XRD-203-Section 12
AD-366589	XRD-200-Section 9
AD-366590	XRD-204-Section 13
AD-366591	XRD-183
AD-366586	XRD-201-Section 10
AD-367487	XRD-131-Volume 2
AD-367516	XRD-143
AD-367493	XRD-142
AD-801410L	XRD-138
AD-376831L	XRD-83
AD-366759	XRD-80
AD-376830L	XRD-79
AD-376828L	XRD-76
AD-367464	XRD-106
AD-801404L	XRD-105-Volume 1
AD-367459	XRD-100

TRC 18 April 1997

Subject: Declassification of Reports

AD-367491	XRD-134-Volume 2
AD-367479	XRD-123
AD-367478	XRD-122
AD-367481	XRD-125
AD-367500	XRD-159-Volume 2
AD-367499	XRD-160-Volume 3
AD-367498	XRD-161-Volume 4
AD-367512	XRD-147
AD-367511	XRD-148
AD-367465	XRD-107
AD-366733	XRD-43
AD-367477	XRD-121
AD-367476	XRD-120
AD-367467	XRD-109-Volume 1
AD-367475	XRD-119
AD-367474	XRD-118
AD-367473	XRD-117
AD-367472	XRD-116
AD-367471	XRD-115
AD-367466	XRD-108
AD-801405L	XRD-113
AD-367470	XRD-112
AD-367469	XRD-111

TRC 18 April 1997

Subject: Declassification of Reports

AD-801406L ✓ XRD-114.

In addition, all of the cited reports are now **approved for public release; distribution statement "A" now applies.**

Ardith Jarrett

ARDITH JARRETT
Chief, Technical Resource Center