[redacted]

55. That all personnel in the port catapult machinery and pump rooms were killed, leaving no surviving eye witnesses who can testify to the sequence of events that occurred in the port catapult spaces just prior to the explosion.

56. That three unidentified bodies were found in the after end of the port catapult room.

57. That an unidentified body was found in the access trunk at the fourth deck level near the door leading into the pump room.

58. That there was no direct explosive damage to the port catapult compartment, nor was there evidence of sufficient sustained heat to warp any structure therein.

59. That, subsequent to the explosions, the port catapult compartment was found coated with a heavy deposit of soot which was saturated with oil in the immediate area of the launching accumulator. This deposit was heaviest in the forward portion of the catapult compartment and extended into the outer passageway and aft, diminishing in quantity away from the catapult compartment.

60. That the deck of the port catapult machinery room was found covered with a layer of hydraulic oil under which was a layer of soft carbonaceous material.

61. That the deck of the port catapult pump room was found covered with a layer of hydraulic oil.

62. That the launching indicator card was removed from the port catapult after the accident and, upon removal of carbon deposits, approximately 75 percent of the power stroke tracings was legible.

63. That this indicator card contained tracings of multiple launchings, all of which were normal throughout the legible portions, and showed an approximate 2700 p.s.i. launching pressure.

[redacted]

[redacted]

64. That all valves and controls on the port catapult launching and retraction panels were found in the proper position for normal catapult operations.

65. That the port catapult engine was found in the battery position with the piston valve securing stem full out (normal) and the firing operating valve in "standby" which is the normal operating position.

66. That the launching sump and gravity tanks were found empty.

67. That the launching pumps were found clean and undamaged and had normal relief valve settings.

68. That one or more of the launching hydraulic pumps continued to discharge into the accumulator after the casualty.

69. That the strainer of launching pump No. 14 was found covered by a heavy deposit of lint.

70. That the port hydraulic pump vent piping was found to discharge to the suction side of the pump in lieu of the gravity tank as prescribed by the manufacturer's plans.

71. That there was fire in the accumulator, as evidenced by:

(a) Internal carbonaceous deposits,

(b) Intergranular penetration by molten brass of the stainless steel pilot of the relief valve,

(c) Severe erosion of the relief valve pilot and other interior portions of the relief valve,

(d) Destruction of 40 percent of the upper part of the brass Tee-fitting, reducing it to a cusped form.

(e) Complete disintegration of the brass poppet in the relief valve,

[redacted]

[redacted]

(f) Annealing of the lower helix of the relief valve spring, indicating temperatures above 1350° F,

(g) Enlargement of the threaded hole of the accumulator top flange by about ½ inch in diameter,

(h) Hardening of the periphery of the hole of the accumulator top flange to Rockwell C 50,

(i) Carbon deposits in the relief valve,

(j) Burning of the paint on the overhead of the compartment in a roughly circular area with the center directly above the accumulator, and,

(k) Blistered paint on the forward side of 25 #STS bulkhead 39, but only at the top just forward of the accumulator.

72. That the overboard discharge line from the port launching accumulator relief valve was found ruptured at a 90° bend near the relief valve.

73. That the relief valve was found on the deck alongside the piston valve, approximately 8 feet from the accumulator.

74. That the port launching accumulator relief valve had been replaced by ship's force in March, 1954, with one drawn from stock, and that the stock description indicated that it was pre-set at 4,000 p.s.i.

75. That the brass Tee-fitting was found separated from the accumulator flange due to the fracture of a steel nipple.

76. That the brass elbow, connecting the liquid level gage line to the 4 inch air line of No. 1 air flask, was ruptured outward by internal pressure below its hot-short temperature.

[redacted]

77. That the paint on the overhead above the burst elbow, connecting the liquid level line to the 4 inch air line between the accumulator and No. 1 air flask, was found unburned and clean.

78. That, subsequent to rupture, the elbow in the liquid level gage line was not heated above its recrystallization temperature.

79. That the interior of the liquid level gage line, from the ruptured elbow to a point in the middle liquid level gage corresponding to the 52 inch level in the accumulator, was found coated with carbon.

80. That the entire interior of the 4 inch line connecting No. 1 air flask to the accumulator was found coated with carbon.

81. That the interior surfaces of the 4 inch lines, connecting the No. 3 and No. 4 air flasks to the accumulator, were found coated with carbon a distance of about 18 inches from the accumulator; and that the interior of the 4 inch line of No. 2 air flask was found coated nearly to the air flask.

82. That the port launching accumulator was found to contain oil to within 25 inches of the top flange.

83. That the interior of the accumulator was found covered with relatively heavy patches of carbon down to within 36 inches of the bottom flange.

84. That the oil level at the end of a launching, when using a 2700 p.s.i. launching pressure would normally be 36 inches, measured from the lower accumulator flange.

85. That the interior of No. 1 air flask was found clean except for numerous rivulets of black carbonaceous sludge extending from the upper mouth of the flask down to the liquid level.

[redacted]

95. That the port catapult launching pressure gages were found undamaged and indicated zero.

96. That, when one of the launching pressure gages was subjected to increasing test pressures after the casualty, permanent damage resulted at 6500 p.s.i. test pressure.

97. That the right hand port launching regulator unit was found in the full right position, corresponding to a pump cut-off pressure of 3750 p.s.i.

98. That the launching pump regulator selector switch was found in the full right hand position, in which position the right hand regulator unit is controlling the pumps.

99. That it was general practice to control the launching pressure by manual control of the pressure regulators.

100. That about two hours after the explosion the port catapult retracting system was at 425 p.s.i. with the pressure regulator selector in neutral. At this time the launching pressure was zero.

101. That the interior of the air charging line and fixtures at the end of this line (pressure gages, air blow down valve, main air charging valve, pressure gage manifold, pressure regulator valve and regulator proper) were found clear of any carbon deposits, and the interior of this line was found coated with a thin film of oil for at least 15 feet from the accumulator, while adjacent to the regulator valve it contained a trace of water and corrosion products, but no oil.

102. That the section of pipe between the middle and lower liquid level gages was found to be standard weight low pressure steel pipe and no distortion had occurred.

[redacted]

[redacted]

103. That in April 1954, while in Jacksonville, Florida, the starboard gravity tank had overflowed about fifty to one hundred gallons of oil foam into the elevator pit following operations and that overflow was a common occurrence.

104. That a small amount of oil foam was emitted from the screened vent on top of the port launching gravity tank during the plane launchings on 26 May 1954.

105. That the port catapult retracting sump tank vent has, on various occasions, discharged mist into the second deck port passageway abreast the wardroom.

106. That launching accumulator relief valves of H8 catapults in various ships have opened during catapult operations for unknown reasons.

107. That Diesel action in the liquid phase in catapults has been a familiar phenomenon for many years and has not led to any serious consequences heretofore.

108. That previous instances have been reported of air reaching the piston valve from the accumulator due to vortex action in the accumulator of H8 catapults.

109. That an anti-vortexing baffle was installed in the bottom of the catapult launching accumulators of the HORNET in an attempt to eliminate such air carryover.

110. That existing test specifications on the H8 catapult prescribe an hydrostatic test of 3850 p.s.i. prior to certification of the catapult for service.

111. That three authorized catapult changes and a part of one catapult bulletin were not accomplished on the port catapult, as follows:

[redacted]

[redacted]

Change No. 19

Change No. 25

Change No. 27

Bulletin No. 72 (painting certain valve handles white)

112. That ALNAV 60, which prescribes certain safety precautions arising out of the LEYTE explosion, was received on board the U.S.S. BENNINGTON on 6 December 1953, but had not been sighted by the present Air Officer, the V2 Division Officer and the Catapult Officer.

113. That the Air Department of the U.S.S. BENNINGTON was not organized in strict accordance with ComAirLant Standard Air Department Instructions which were issued for guidance.

114. That the catapult logs were not found to be in strict accordance with current ComAirLant Standard Air Department Instructions which were issued for guidance.

115. That, immediately after the LEYTE explosion, a top priority study of applying less flammable fluids was undertaken. Houghto-Safe 271 was tested at N.A.M.C. in catapult pumps and immediately thereafter in each model of service catapults. After 3,000 test launchings in the H4 Catapult, arrangements were made to service test Houghto-Safe in the port catapult of the U.S.S. LEYTE, during the period of which test, the BENNINGTON casualty occurred.

116. That Hydrolubes are not flammable in air at atmospheric pressure with any degree of spray dispersion.

117. That, immediately after the LEYTE explosion, a survey was made to determine the nitrogen requirements of all shipboard hydraulic systems and that all requirements have been met except for hydro-pneumatic catapults for which a sufficient source of supply of nitrogen has not yet been found.

[redacted]

[redacted]

118. That action was initiated on all the recommendations of the LEYTE Court of Inquiry.

119. That the development of an overboard discharge from the catapult accumulators involving use of rupture discs was being prosecuted at the time of the casualty.

120. That in high pressure hydro-pneumatic systems using oil, insurance underwriters require the use of nitrogen, in lieu of air.

121. That the estimated cost of all repairs resulting from the casualty is $2,071,954 and the time required is 3 months, on a single shift, no overtime basis, the controlling jobs being repair of the hangar deck and repair of the port catapult.

122. That there has been found no evidence of sabotage.

123. That the Commanding Officer had repeatedly and continuously stressed safety in the operations of the ship.

124. That the exact initiator of the fire in the port catapult launching hydro-pneumatic system has not been positively determined.

[redacted]

[redacted]

- OPINIONS -

1. That the heavy and loosely adhering carbon deposits on the piston valve and the closely adhering deposit on the interior of the accumulator end of the piston valve housing were evidently deposited thereon by combustion of oil within the housing.

2. That rapid closing of the piston valve can result in Diesel ignition which might be evidenced by carbon deposits on the piston valve and within the piston valve housing.

3. That the most probable cause of the fire within the port launching high pressure hydro-pneumatic system is Diesel ignition in the piston valve and piston valve housing.

4. That the most probable sequence of events in the catapult casualty is:

(a) The catapult was fired normally;

(b) The level of oil in the accumulator dropped rapidly and normally;

(c) A vortex was formed at the bottom of the accumulator in which an air column extended into the manifold and possibly to the piston valve;

(d) As the cross-head approached the end of the launching stroke, the piston valve cut-off was energized in the normal manner;

(e) The control valve actuating line, containing abnormal quantities of air, closed the piston valve abruptly in an abnormal manner;

(f) Diesel ignition occurred as a result of the piston valve closing violently on its seat;

(g) Sufficient air from the vortex remained between the piston valve and the accumulator, through the manifold, to permit propagation of the flame to the accumulator and oil discharge from the hydraulic pumps would tend to assist passage of the flame back to the accumulator;

(h) Oil vapor and foam in the accumulator ignited;

(57)

[redacted]

(i) A rapid increase in pressure occurred within the accumulator, connecting piping and air flasks;

(j) The relief valve opened;

(k) The overboard discharge line burst at the bend adjacent to the relief valve, causing gas and flame to be discharged into the catapult room;

(l) Hot gas and flame, passing through the relief valve, eroded the interior and then blew it off the accumulator;

(m) The upper 40 percent of the brass Tee-fitting was melted and washed away by hot gas and flame;

(n) The steel nipple failed allowing the brass "cusped" Tee-fitting to blow off;

(o) The flame and hot gas continued to pour out of the accumulator flange hole until the diameter was enlarged $\frac{1}{2}$ inch;

(p) The brass elbow in the liquid level gage line connected to the 4 inch line leading to No. 1 air flask burst at some indeterminate time after the initiation of the fire in the accumulator;

(q) The hole in the brass elbow permitted the simultaneous discharge of high pressure air from the 4 inch line and hydraulic oil from the liquid level gage line forming an air-oil mixture or oil fog which spread through the forward part of the ship;

(r) The flame at the top of the accumulator slowly changed in composition as the air supply was diminished due to combustion and ultimately the process became typical of a gas generator in which partial combustion cracks some of the oil, whereupon the inflammable by-products also spread through the forward part of the ship;

(s) The oil rich flame generated large quantities of carbon which were deposited on surfaces in the form of soot.