

407350

R

APPROX UPON WHICH SIGNIFICANT NUCLEAR FAILURE TEST WERE CONDUCTED

1950-1955

PROJECT PROYING GROUNDS

DURING

1950-1955

DRAFT

CONFIDENTIAL

Handwritten signature

Handwritten signature

In light of [redacted] on Bikini and ENIWETOK atolls it is prudent that some consideration be given to fallout from the Pacific Proving Grounds which has been carried to these atolls during the period of atmospheric testing.

Fallout patterns and [redacted] nuclear tests are very limited. However, radiographs available for nearly all of the tests conducted in the Pacific. These radiographs and available fallout patterns have been [redacted] [redacted] may have had fallout on Pacific atolls. These radiographs and fallout patterns which [redacted] [redacted] have provided indications of a [redacted] significant fallout on these atolls are indicated, as well as the location of such information.

Due to the intense fallout from the 1954 H-B event on RONGELAP and UTIRIK atolls, some effort was made to [redacted] investigate the radioactive deposits on these and a few other atolls in the fallout pattern. Unfortunately, the utility of these investigations was limited due to the ^{Small number of} atolls visited, the [redacted] treatment of the data (gross gamma, gross beta, and other crude evaluation), and lack of [redacted] data on RONGELAP, BIKINI and ENIWETOK atolls have any recent studies [redacted] undertaken. The rest of the fallout area ^{apparently [redacted] [redacted] [redacted]} [redacted] been ignored.

Utilizing various reports, fallout radiographs and radiographs, this investigator has evaluated the data available, [redacted] [redacted] and [redacted] that [redacted] fallout has occurred on several atolls which [redacted] have been investigated previously. [redacted] [redacted] papers suggesting it, is presented as figures with other pertinent data. [redacted] presented in tabular form for brevity.

COMMENTS ON SOURCE INFORMATIONFallout Patterns

The source documents (^{1147d} [redacted] the referenced portion of this report) indicate the [redacted] rate patterns for the fallout patterns have been drawn to show the gamma [redacted] rate in megareps per hour, some feet above the ground, in terms of the one hour after burst reference time. The $r^{-1.2}$ approximation was used when no actual data points were available for direct radiation measurements to the one hour reference time. It is important to recognize the H + 1 hour is used as a reference time, and that fallout patterns from low yield were complete at one hour after burst. For high yield weapons, fallout over some parts of the vast area shown did not complete until many hours after burst.

Where several fallout patterns were available for a particular event, each has been presented.

Hodographs

The hodographs were drawn for a constant vertical rise rate of 5,000 ft/hr and are presented because other, or more detailed, information is not available. Several hodographs are [redacted] from the H plus times indicated by the number at the end of the arrow. Other [redacted] plus hours.

It is recognized that fallout did not necessarily follow the hodographs presented herein. However, a simple comparison of the CASILE BRAVO hodographs with the actual or model fallout patterns will show the merit of their consideration.

FINDINGS

~~_____~~ There are eleven nuclear tests which may have deposited radioactive materials in significant amounts greater than world wide fall-out on several of the Pacific Islands. These tests and the atolls they may have contaminated are indicated in Table 1. Additionally, the fallout pattern, if available, for several of the tests are indicated in Figures through for each test. ~~_____~~ For immediate reference, the habitations of the atolls are indicated, with population figures and details where applicable, in Table 2.

It is pertinent to note that in addition to ENIWETOK, BIKINI, AILINGINAE, RONGELAP, RONGERIK, BIKINI, ~~_____~~ ~~_____~~ atolls, which have been ~~_____~~ by other nuclear tests, several other atolls are indicated: AILUK, JENI, ~~_____~~ ~~_____~~, UJAE, UJELANG, WOTHO ~~_____~~ and WOTJE. Since the habitations of the atolls ~~_____~~ ~~_____~~ ~~_____~~ and possibly AILINGINAE, ~~_____~~ ~~_____~~ are somewhat limited, these may also added to ~~_____~~ ~~_____~~ ~~_____~~ that, including the "source" atolls of ENIWETOK and BIKINI, a total of 19 atolls may have been contaminated with ~~_____~~ ~~_____~~ radioactive materials. Only on three, ENIWETOK, BIKINI and RONGELAP, ~~_____~~ ~~_____~~ if UTIRIK is included, is there any ~~_____~~ ~~_____~~

Since actual fallout patterns are lacking ~~_____~~ of the ~~_____~~ events, an ~~_____~~ was made ~~_____~~ weigh the potential of each event. ~~_____~~

~~_____~~ the fallout pattern of the CASLE BRAVO event is well known (see ~~_____~~ there are three different fallout patterns available) this deposition potential was ~~_____~~ to ~~_____~~ ~~_____~~ ~~_____~~ ~~_____~~ ~~_____~~ ~~_____~~ presented in Table 3. The ~~_____~~ expressed here is really a factor, or multiplier, of the CASLE BRAVO ~~_____~~ it may be applied simply by taking the CASLE BRAVO deposition ~~_____~~ distance from the ~~_____~~

Handwritten notes:
 1. ~~_____~~
 2. ~~_____~~
 3. ~~_____~~
 4. ~~_____~~
 5. ~~_____~~
 6. ~~_____~~
 7. ~~_____~~
 8. ~~_____~~
 9. ~~_____~~
 10. ~~_____~~
 11. ~~_____~~
 12. ~~_____~~
 13. ~~_____~~
 14. ~~_____~~
 15. ~~_____~~
 16. ~~_____~~
 17. ~~_____~~
 18. ~~_____~~
 19. ~~_____~~
 20. ~~_____~~
 21. ~~_____~~
 22. ~~_____~~
 23. ~~_____~~
 24. ~~_____~~
 25. ~~_____~~
 26. ~~_____~~
 27. ~~_____~~
 28. ~~_____~~
 29. ~~_____~~
 30. ~~_____~~
 31. ~~_____~~
 32. ~~_____~~
 33. ~~_____~~
 34. ~~_____~~
 35. ~~_____~~
 36. ~~_____~~
 37. ~~_____~~
 38. ~~_____~~
 39. ~~_____~~
 40. ~~_____~~
 41. ~~_____~~
 42. ~~_____~~
 43. ~~_____~~
 44. ~~_____~~
 45. ~~_____~~
 46. ~~_____~~
 47. ~~_____~~
 48. ~~_____~~
 49. ~~_____~~
 50. ~~_____~~
 51. ~~_____~~
 52. ~~_____~~
 53. ~~_____~~
 54. ~~_____~~
 55. ~~_____~~
 56. ~~_____~~
 57. ~~_____~~
 58. ~~_____~~
 59. ~~_____~~
 60. ~~_____~~
 61. ~~_____~~
 62. ~~_____~~
 63. ~~_____~~
 64. ~~_____~~
 65. ~~_____~~
 66. ~~_____~~
 67. ~~_____~~
 68. ~~_____~~
 69. ~~_____~~
 70. ~~_____~~
 71. ~~_____~~
 72. ~~_____~~
 73. ~~_____~~
 74. ~~_____~~
 75. ~~_____~~
 76. ~~_____~~
 77. ~~_____~~
 78. ~~_____~~
 79. ~~_____~~
 80. ~~_____~~
 81. ~~_____~~
 82. ~~_____~~
 83. ~~_____~~
 84. ~~_____~~
 85. ~~_____~~
 86. ~~_____~~
 87. ~~_____~~
 88. ~~_____~~
 89. ~~_____~~
 90. ~~_____~~
 91. ~~_____~~
 92. ~~_____~~
 93. ~~_____~~
 94. ~~_____~~
 95. ~~_____~~
 96. ~~_____~~
 97. ~~_____~~
 98. ~~_____~~
 99. ~~_____~~
 100. ~~_____~~

similar to the distance from the [redacted] along the [redacted] of the event [redacted] *along the [redacted]*
[redacted] and multiplying it by the "potential" [redacted]. The result should
be a "ballpark" estimate of what fallout may be expected at the location
in question. Obviously, there is no claim to any precision or accuracy with
this method. It is only offered as a [redacted] method to estimate [redacted] possible
deposition in the absence of actual data. [redacted]

TABLE 2. HABITATION OF ATOLLS UNDER DISCUSSION

ATOLL or ISLAND	INHABITED (Pop.) yr.	BEING REINHABITED	UNINHABITED	REMARKS
ATLINGINAE			X	Visited by Rongelapese
ALIFAN	(208) 1962 ¹			
BIVAP			X	
BIRIANG		X		
BNIWETOK		X		
BIRI			X	
TAONGI	(211) 1962 ¹			
TAU	(11) 1962 ¹			
UJAE	(108) 1962 ²			
NEFUI	(203) 1962 ¹			
RONGELAP	(208) 1962 ¹			
RONGERIK			X	Visited by Rongelapese
TAKA			X	Visited by Utirikese
TAONGI			X	
UJAE	(116) 1962 ¹			

TABLE 2. Continued

ATOLL or ISLAND	INHABITED (Pop.) yr.	BEING REINHABITED	UNINHABITED	REMARKS
UJELANG	(340) 1973 ³			
WIKI	(100) 1960 ¹			
WIKI	(100) 1960 ¹			
WIKI	(100) 1960 ¹			

¹ _____, SAILING DIRECTIONS FOR THE PACIFIC ISLANDS, H. O. Pub. No. 82, Vol. I., U. S. Naval Oceanographic Office, 1964. (Chapter 5, Marshall Islands). Change 4 Incorporated, 5 December 1970.

² Henderson, John W., et. al., AREA HANDBOOK FOR OCEANIA, U. S. Government Printing Office, Washington, 1971, p. 503.

³ Tobin, J. A., THE ENEWETAK ATOLL PEOPLE, Special Report for the Radiological Survey of 1972-1973, Majuro, 20 April 1973, p. 10.

TABLE 1. ACQUISITION POTENTIAL ASSOCIATED TO BRAVO

EVENT	POTENTIAL
SANDSTONE ZEPHA	0.012
GREENHOUSE D	0.010
GREENHOUSE C	0.025
IVY KING	0.039
CASTLE BRAVO	1.000
CASTLE UNION	0.720
CASTLE YANKEE	1.050
REDWING ZUNI	0.010
REDWING LAUREL	0.005
HARDTACK MAGNOLIA	0.007
HARDTACK MAPLE	0.007

ATOLLS ON WHICH SIGNIFICANT NUCLEAR FALLOUT COULD HAVE OCCURRED FROM THE PACIFIC PROVING GROUNDS

x = uninhabited

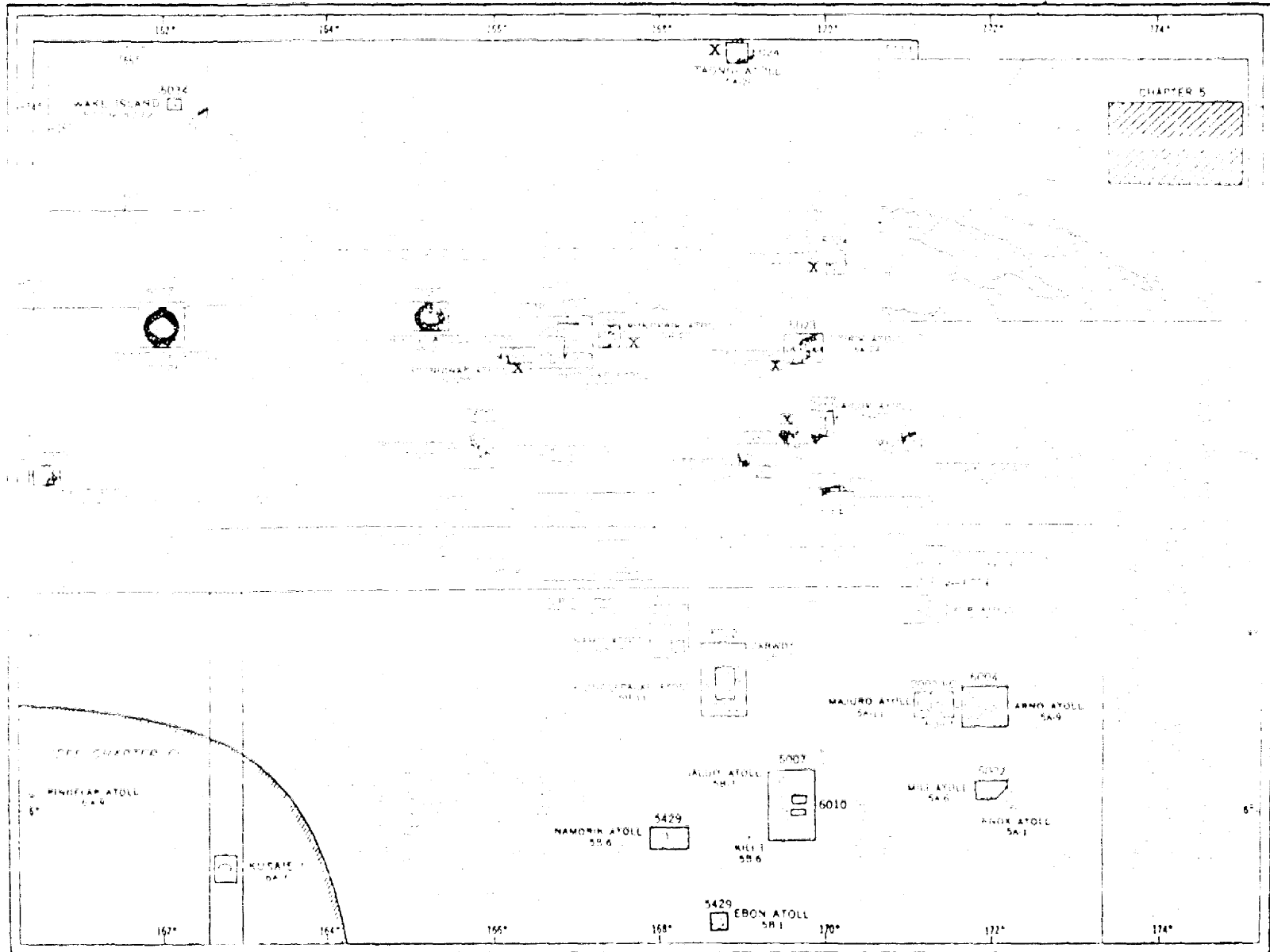


Chart limits shown are of the best scale charts issued to naval vessels by the U.S. Naval Oceanographic Office. Numbers refer to the section in the text describing a designated locality.

CHAPTER 5--GRAPHIC INDEX

GRAPHIC INDEX

H.O. 55--CHANGE 1

ATOLLS EVALUATED BY DUNNING, AUGUST 1957

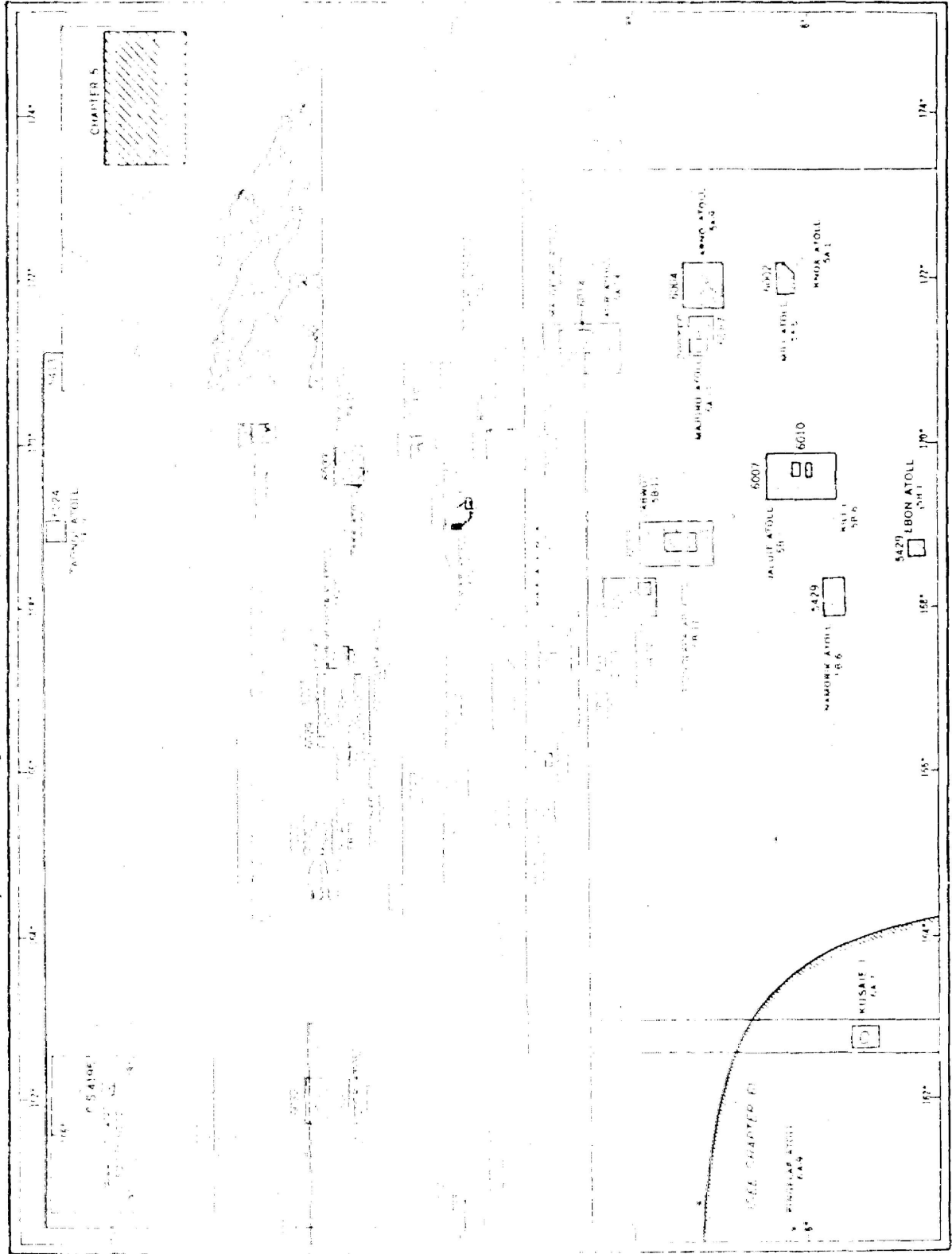
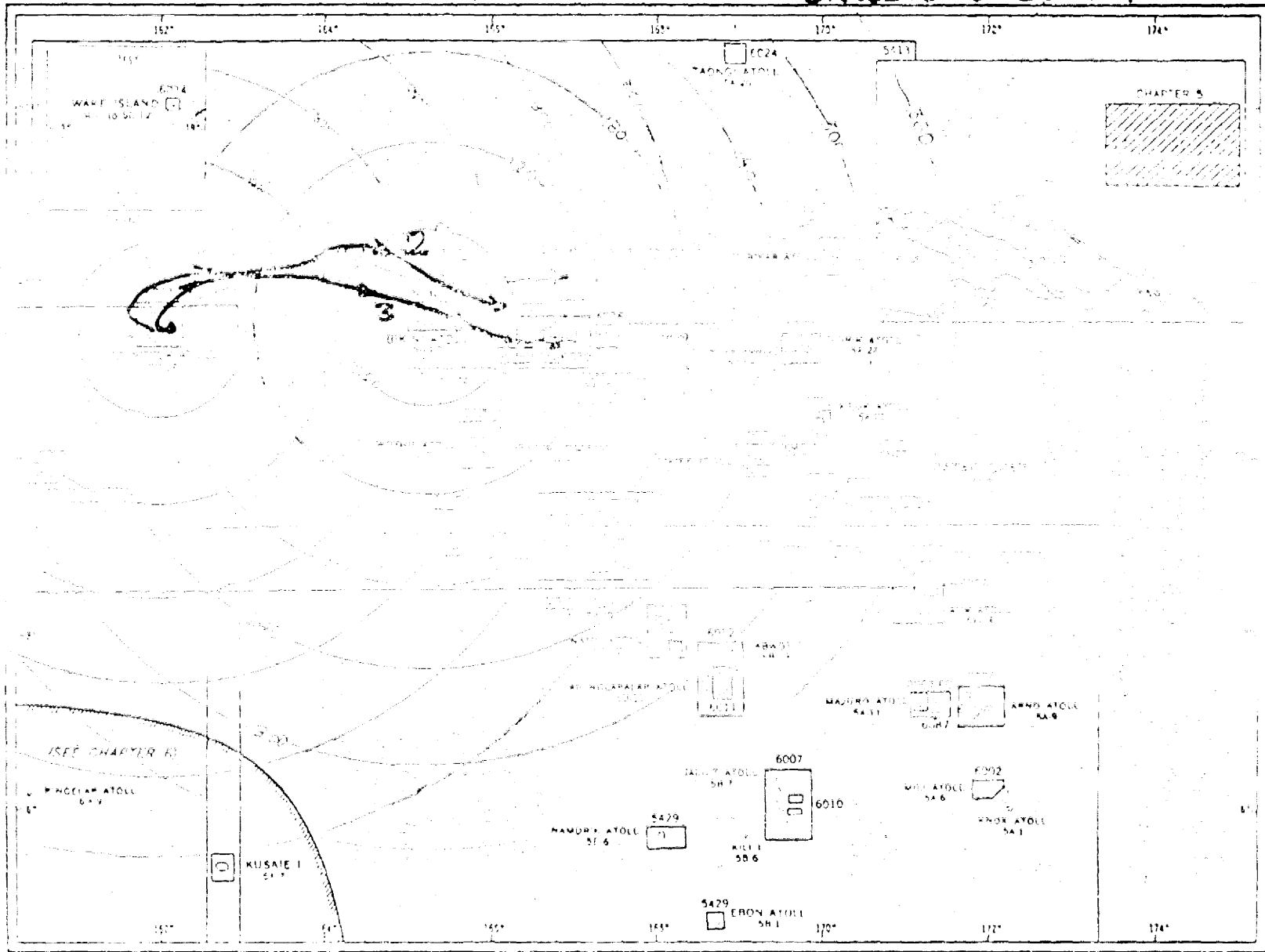


Chart limits shown are of the best scale charts issued to naval vessels by the U.S. Naval Oceanographic Office. Numbers refer to the section in the text describing a designated locality.

POSSIBLE SIGNIFICANT NUCLEAR FALLOUT, PACIFIC PROVING GROUNDS **SANDSTONE ZEBRA**

CIRCLE DISTANCES
TO DRIFT OF 60 NM.
APPROXIMATE BUDGETARY
CIRCULAR ZONE
BOUND



GRAPHIC INDEX

11.0. 67—Change 3

Chart limits shown are of the best scale charts issued to naval vessels by the U.S. Naval Oceanographic Office.
Numbers refer to the section in the text describing a designated locality.

CHAPTER 5—GRAPHIC INDEX

POSSIBLE SIGNIFICANT NUCLEAR FALLOUT, PACIFIC PROVING GROUNDS **GREENHOUSE GEORGE**

CIRCULAR DISTANCE
IN UNITS OF 60 N.M.

APPROXIMATE FALLOUT
CIRCLES
SHOWN

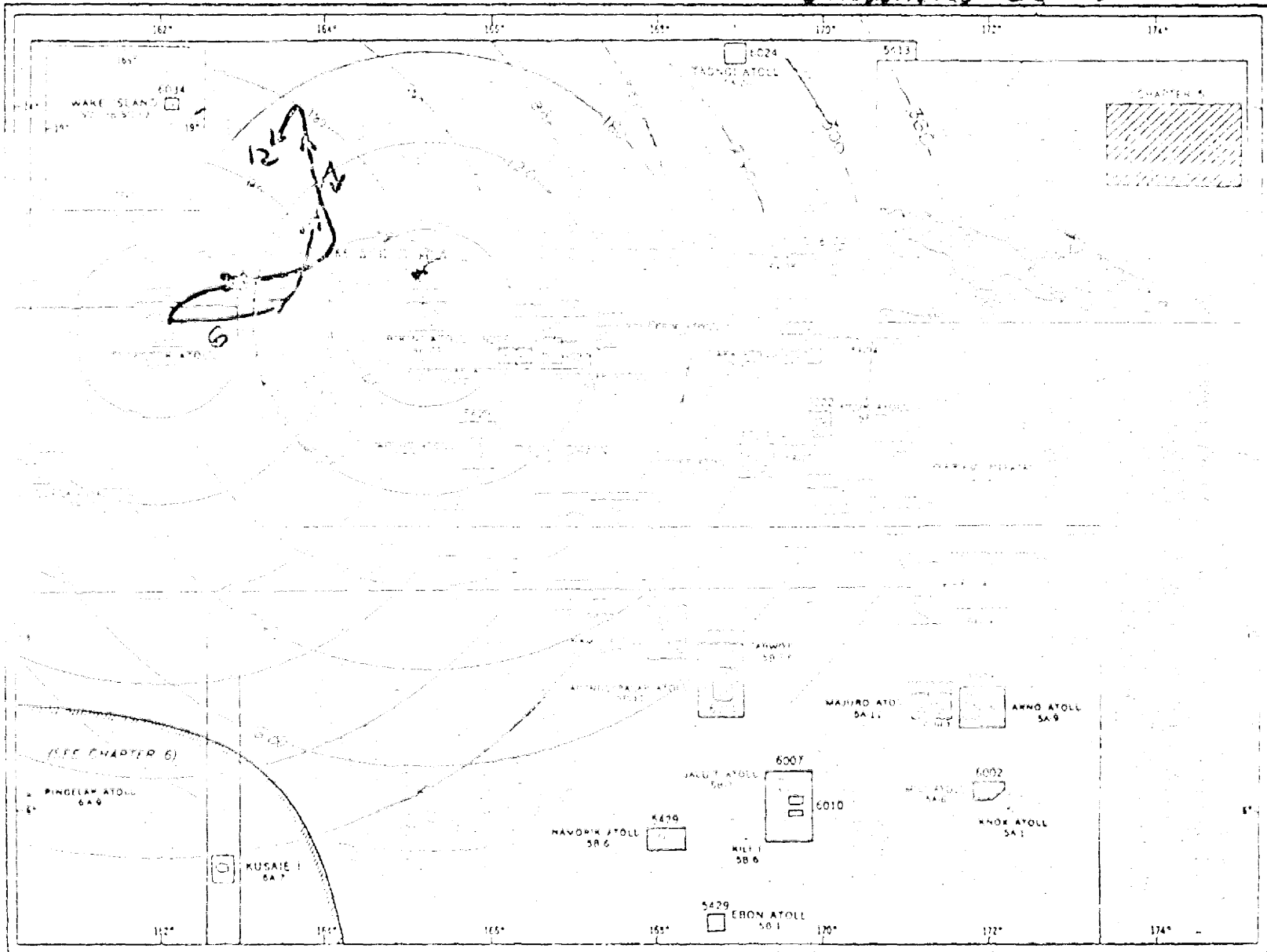
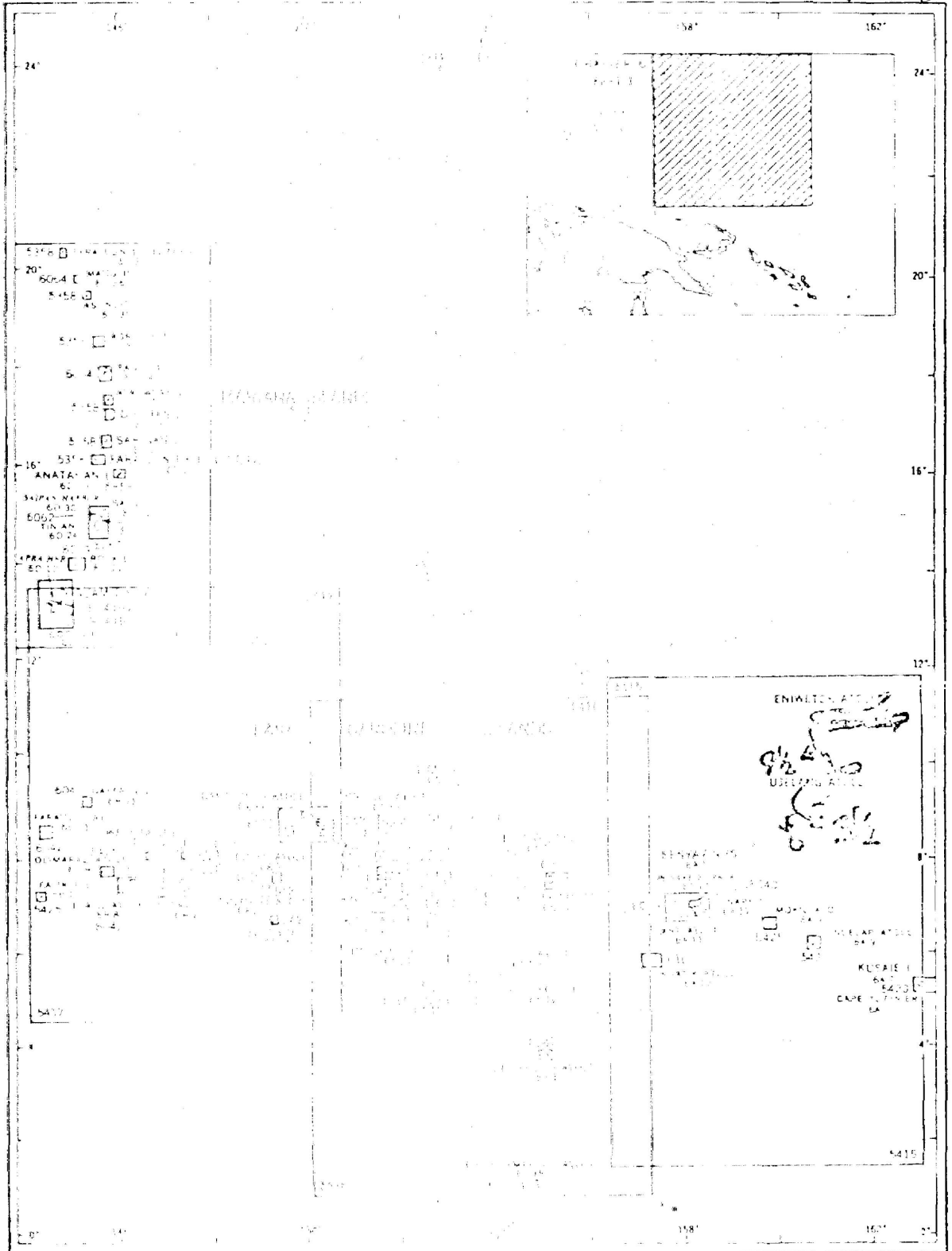


Chart limits shown are of the best scale charts issued to naval vessels by the U. S. Naval Oceanographic Office.
Numbers refer to the section in the text describing a designated locality.

CHAPTER 5--GRAPHIC INDEX

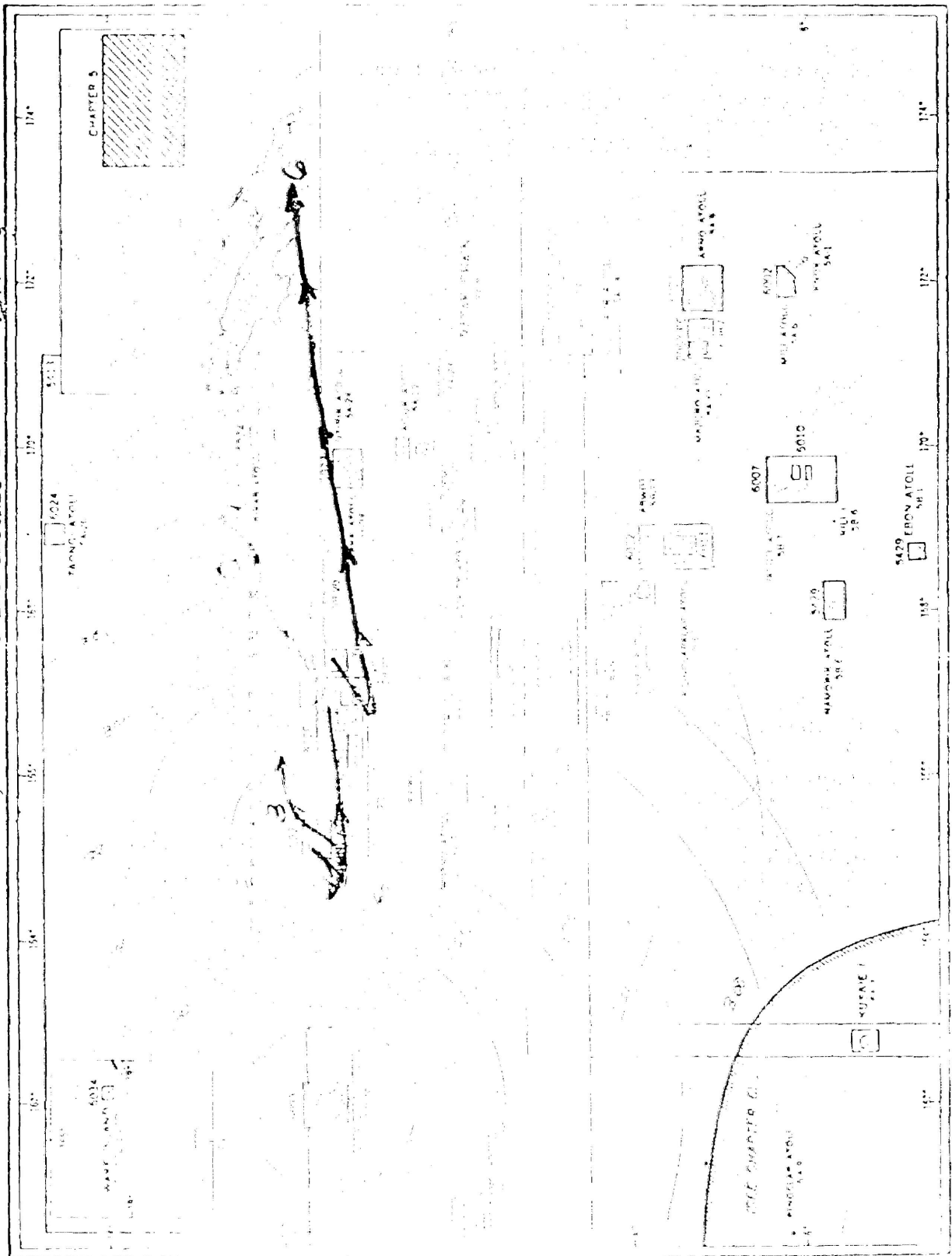
POSSIBLE FORTIFICATION POSITIONS IN THE VICINITY OF THE PROPOSED LANDING GROUNDS IVY KING



Copyright © 1940 by the U.S. Navy, Department of the Navy, Washington, D.C.

(CLASSIFIED BY THE U.S. NAVY)

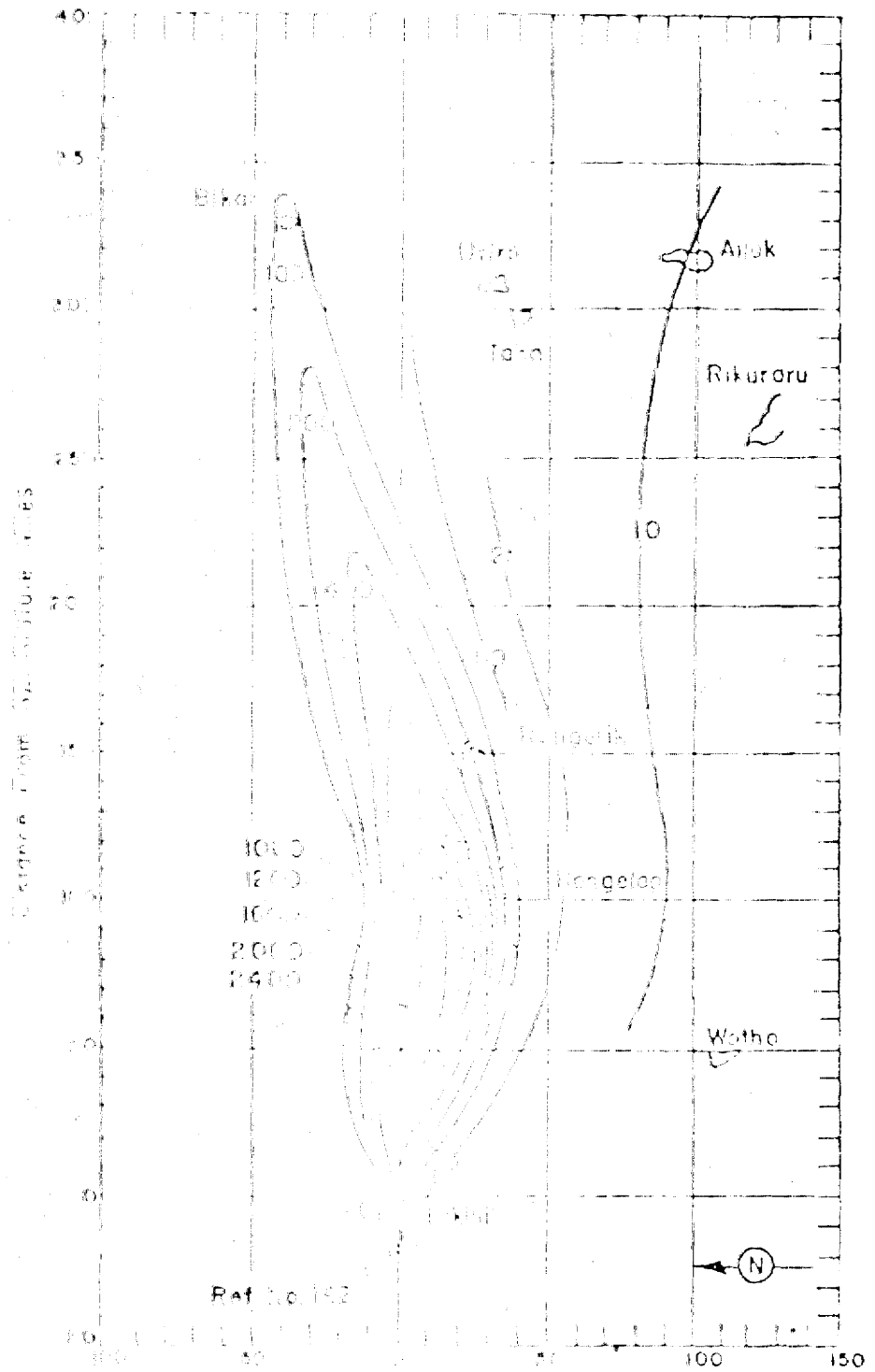
POSSIBLE SIGNIFICANT NUCLEAR FALLOUT, PACIFIC PROVING GROUNDS **CASTLE BRAVO**



GROUND DISTANCE
IN MILES OF 60 MILES

ADVISORY FALLOUT
BOUNDARY

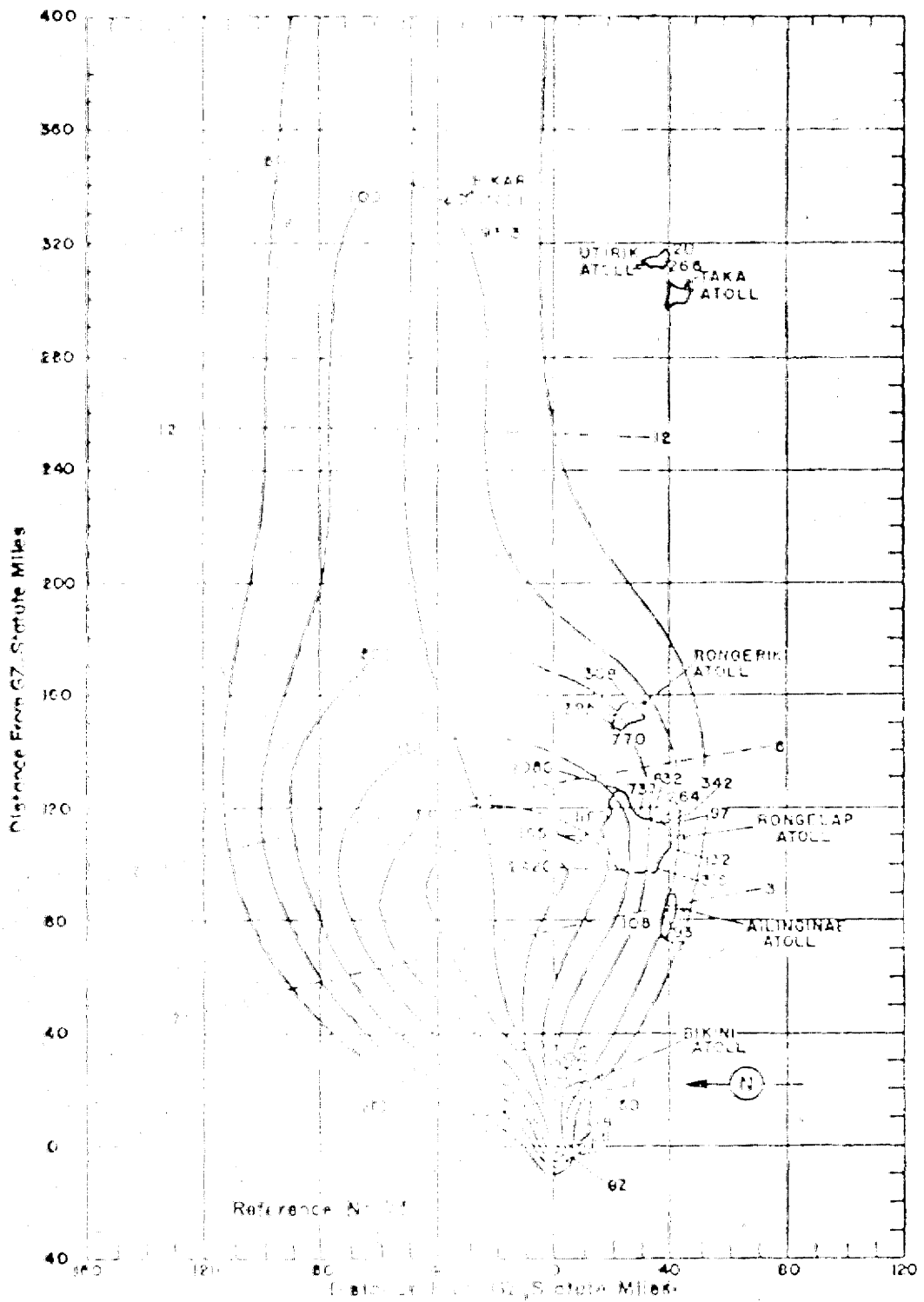
Scale shown for the best results. Refer to naval vessels by the U. S. Naval Oceanographic Office.
Numbers refer to the location of the test or test locality.



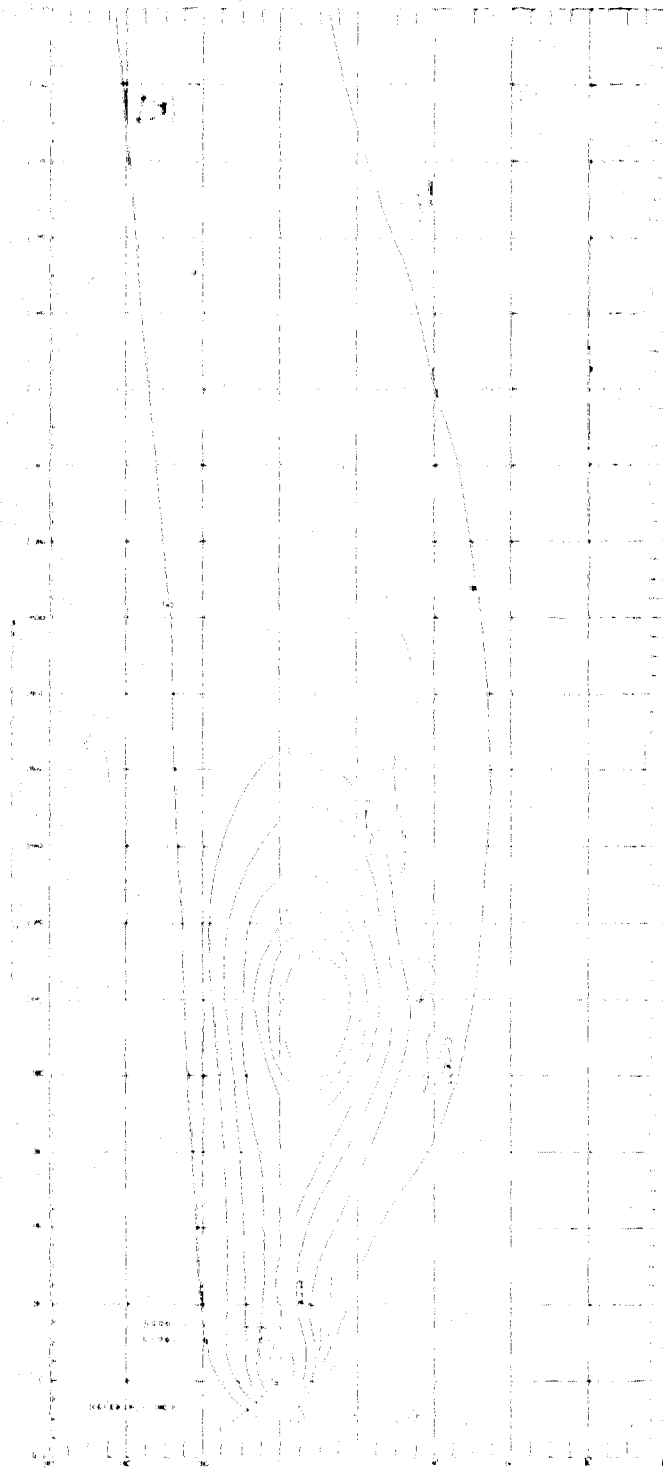
Distance 100.07, Statute Miles

Observation (AMN) at 11:00 - 11:30

Observation (AMN) at 11:30 - 12:00

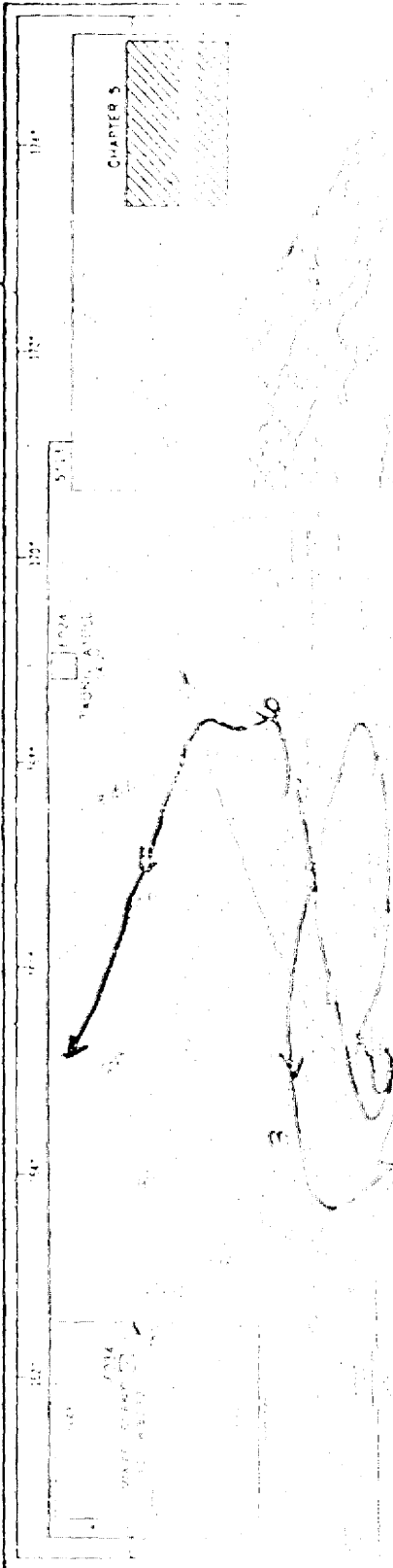


Quantity of...
 ... at H+2 hour (MPL).

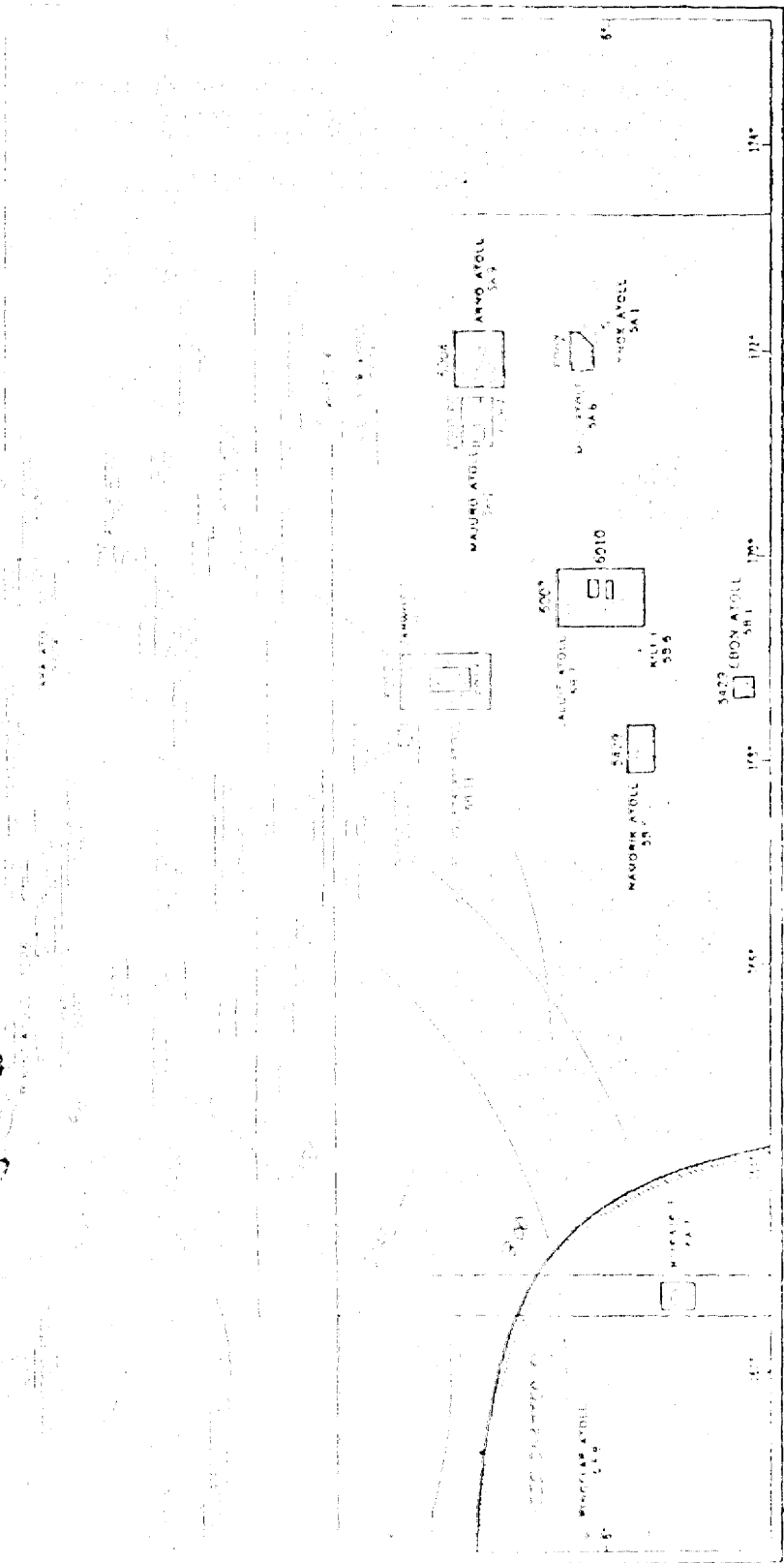


Operation 041901 - 1st - Bravo.
 Off-site concentrations in $\mu\text{g}/\text{hr}$ at N+1 hour (RAND).

POSSIBLE SIGNIFICANT NUCLEAR FALLOUT, PACIFIC PROVING GROUNDS CASTLE UNION

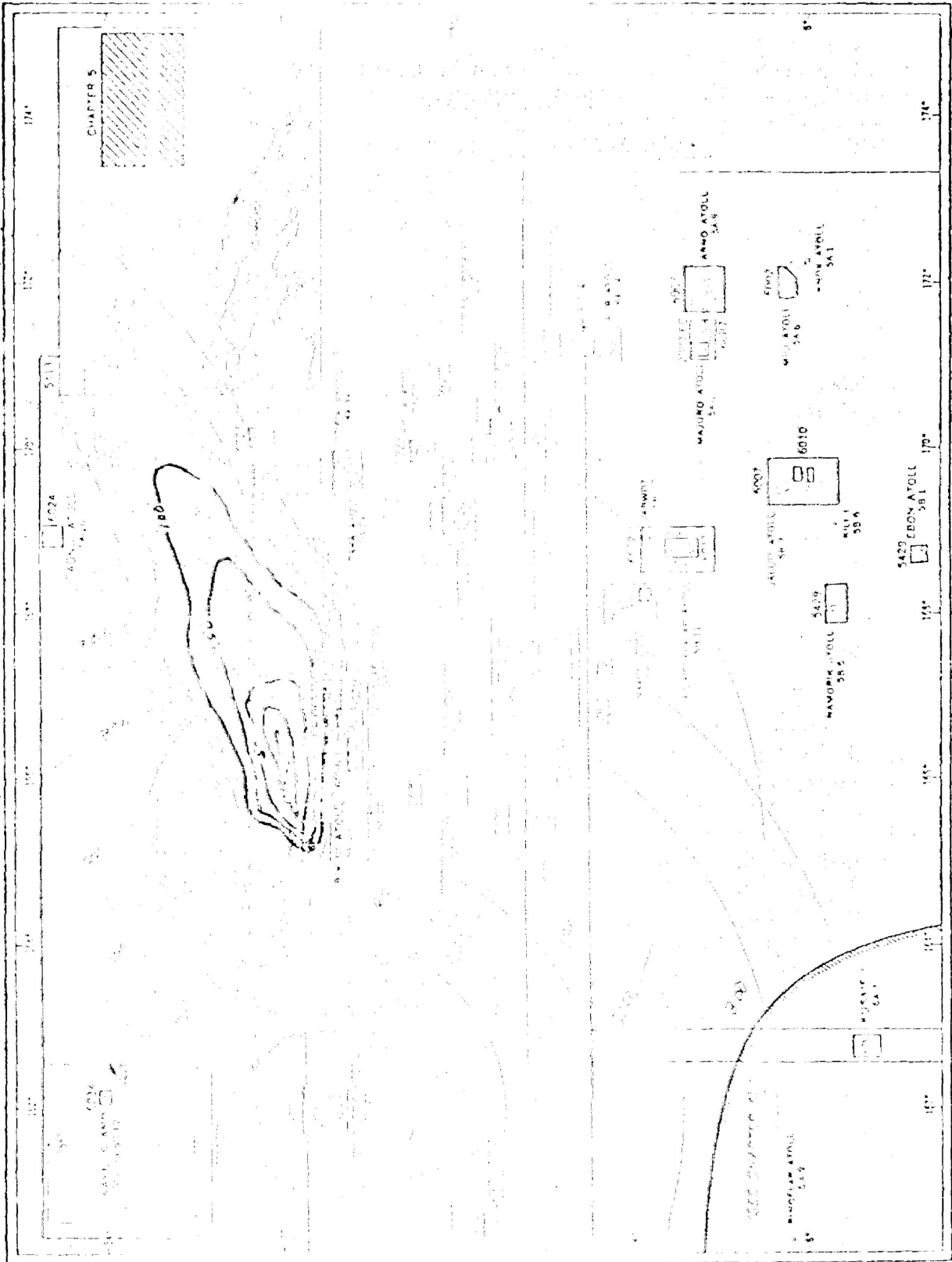


CIRCLE DISTANCE
 OF SOURCE OF FALLOUT
 DIRECTION OF FALLOUT
 OF SOURCE OF FALLOUT



Figures shown per the last scale charts list of naval vessels by the U.S. Naval Oceanographic Office.
 Numbers refer to the action in the text describing a designated locality.

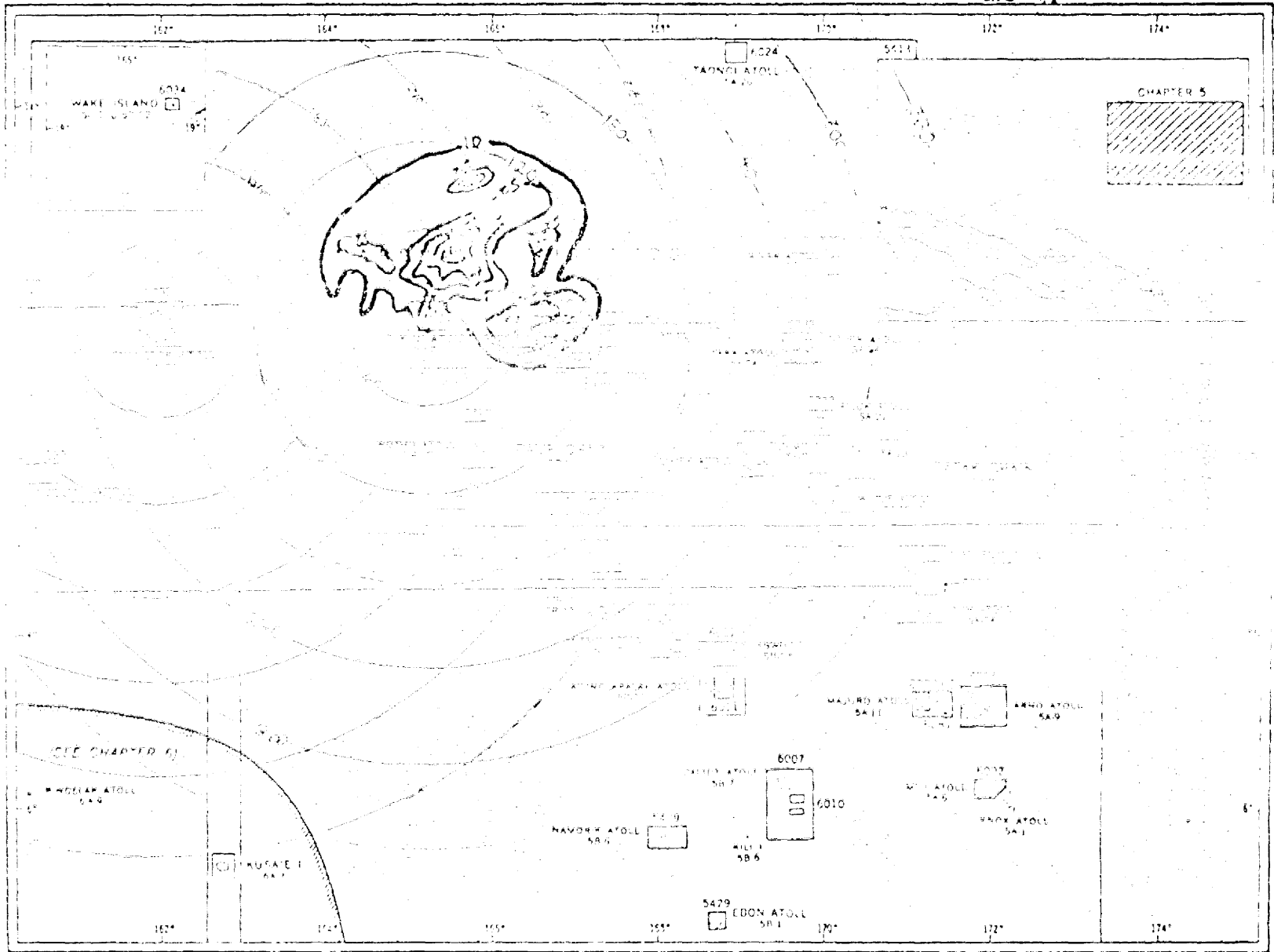
POSSIBLE SIGNIFICANT NUCLEAR FALLOUT, PACIFIC PEWEEING GROUNDS CASTLE YANKEE



CHARTER 5
 100
 R/A 1-0

Chart lines shown are of the best scale charts issued to naval vessels by the U.S. Naval Oceanographic Office. Numbers refer to the section in the text describing a designated locality.

POSSIBLE SIGNIFICANT NUCLEAR FALLOUT, PACIFIC PROOING GROUNDS REDWING ZUNI



CIRCULAR DISTANCE
OF 100 MILES

APPROXIMATE POSITIONING
OF REDWING ZUNI

R/h 1.0

Chart limits shown are of the best scale charts issued to naval vessels by the U. S. Naval Oceanographic Office.
Numbers refer to the section in the text describing a designated locality.

CHAPTER 5—GRAPHIC INDEX

POSSIBLE SIGNIFICANT NUCLEAR FALLOUT, PACIFIC PROVING GROUNDS **REDWING LACROSS**

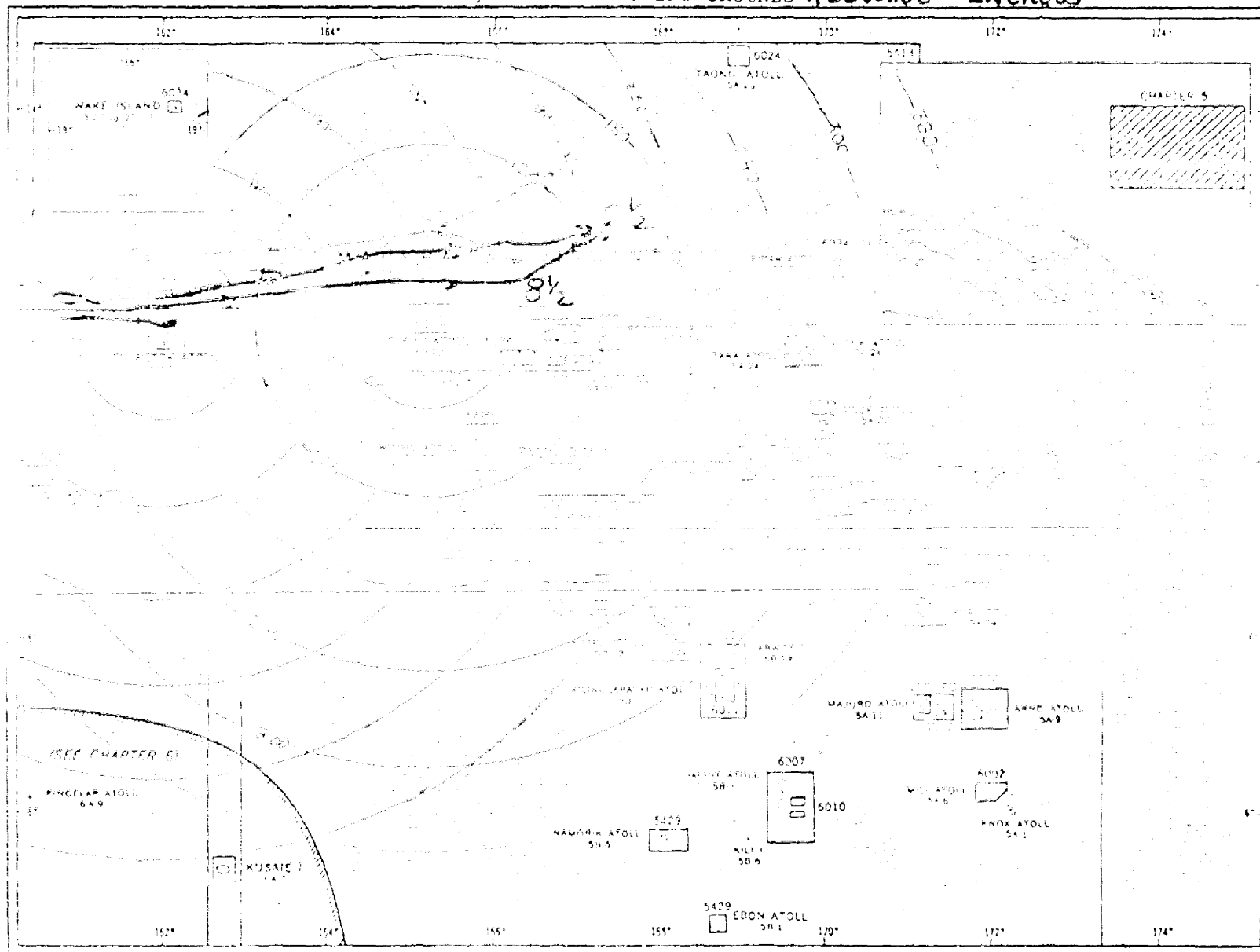


Chart limits shown are of the best scale charts issued to naval vessels by the U.S. Naval Oceanographic Office.
Numbers refer to the section in the text describing a designated locality.

CHAPTER 5—GRAPHIC INDEX

POSSIBLE SIGNIFICANT NUCLEAR FALLOUT, PACIFIC PROVING GROUNDS **HARDTACK MAPLE**

© ROUNDE DIGITAL INC.
21 YEARS OF GOING

APPROXIMATE BOUNDARIES
OF OCEANIC PROVINCES

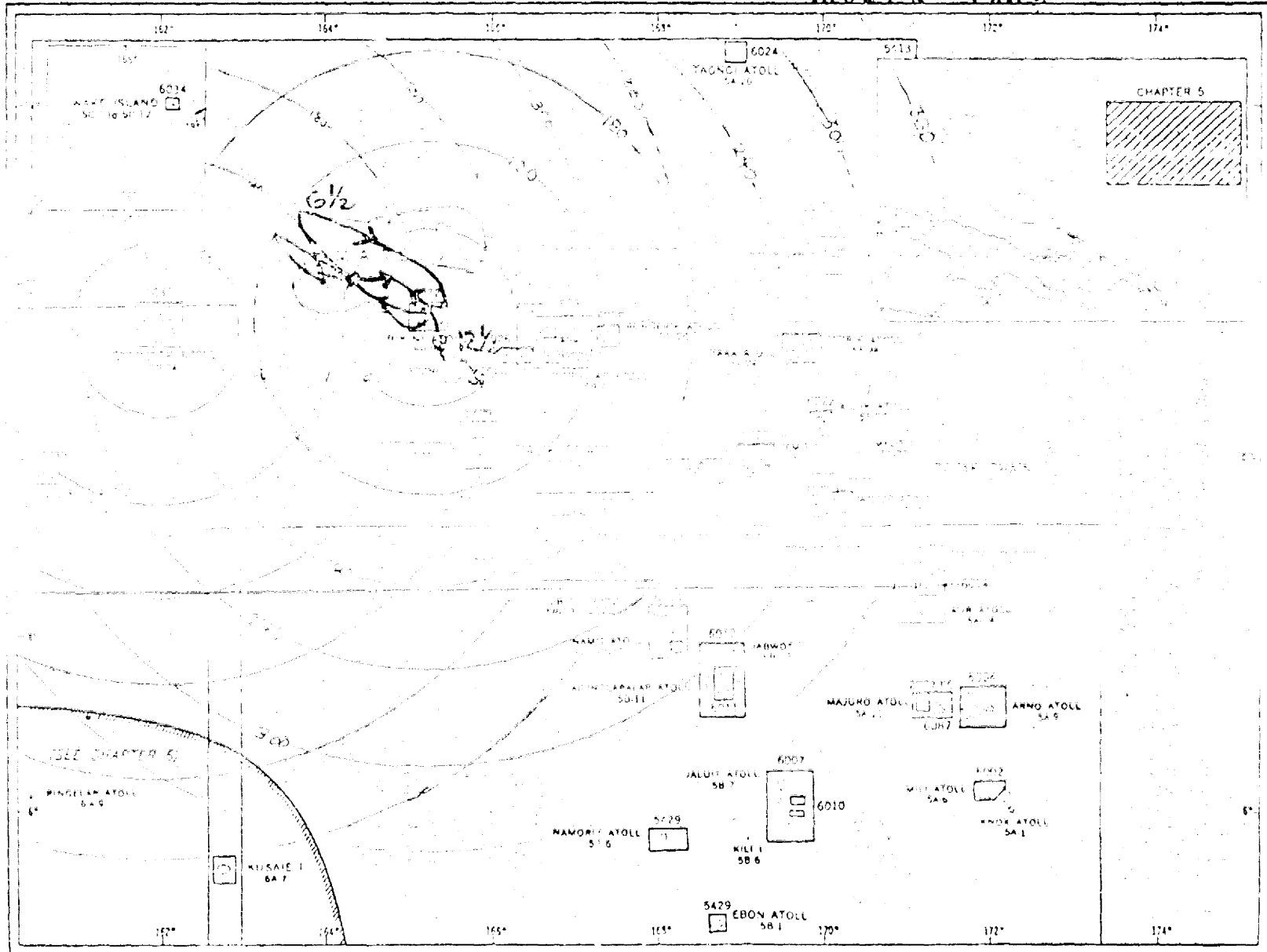


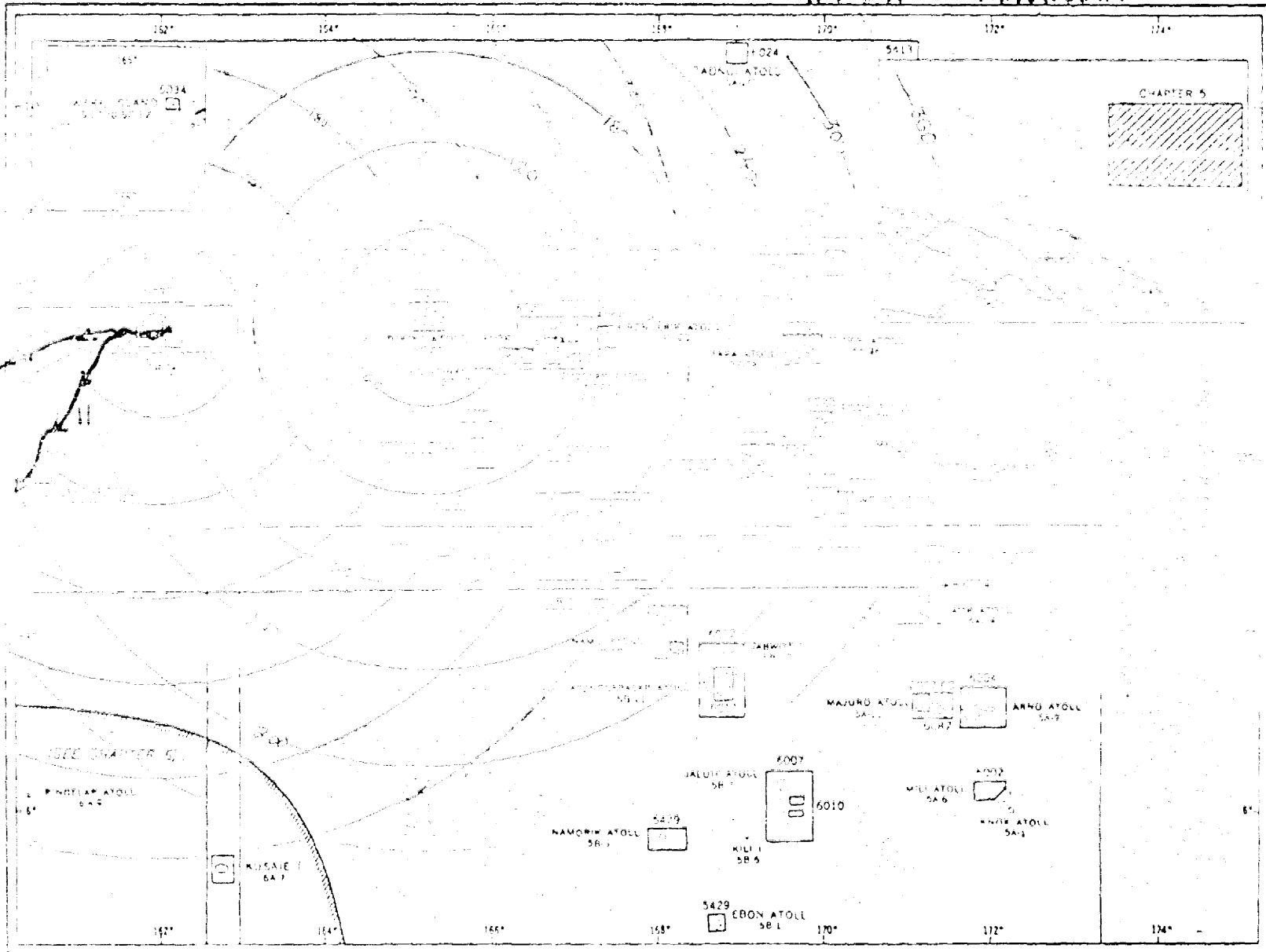
Chart limits shown are of the best scale charts issued to naval vessels by the U.S. Naval Oceanographic Office.

Numbers refer to the section in the text describing a designated locality.

CHAPTER 5—GRAPHIC INDEX

POSSIBLE SIGNIFICANT NUCLEAR FALLOUT, PACIFIC PROEING GROUNDS **HARDTACK MAGNOLIA**

C. ROUTE DISTANCE
 20 SAITS OF 60 NWS



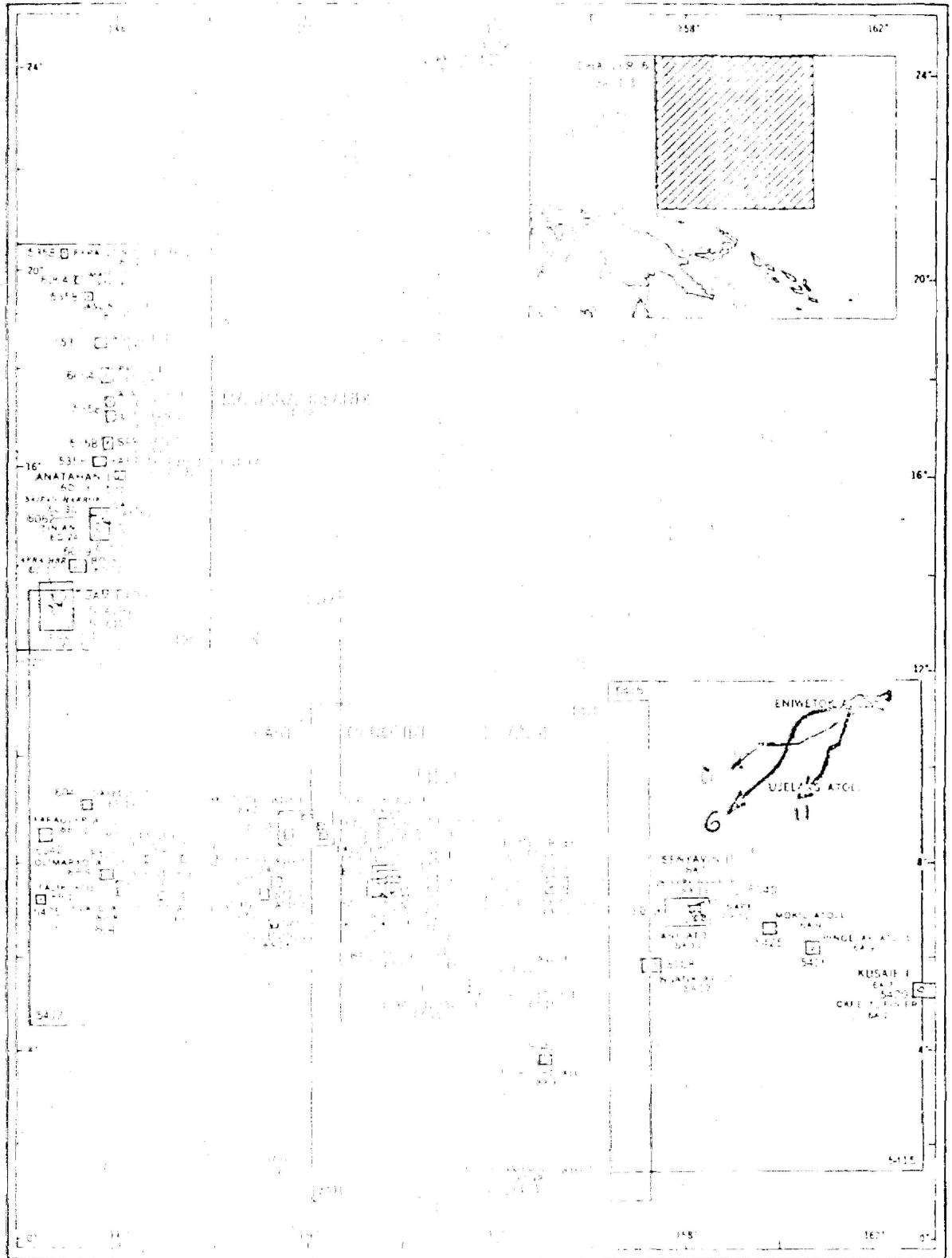
Charts shown are of the best scale charts issued to naval vessels by the U. S. Naval Oceanographic Office.
 Numbers refer to the section in the text describing a designated locality.

CHAPTER 5—GRAPHIC INDEX

GRAPHIC INDEX

H.O. 82—Change 3

POSSIBLE SHIP TRACKS THROUGH MICRONESIA DURING PROWING OPERATIONS **HARD TACK**
MAGNOLIA



Copyright © 1982 by the U.S. Naval Hydrographic Office

GRAPHIC INDEX, BAND 3, CHARTIC INDEX