Received 9/21/79

United States Department of the Interior

GEOLOGICAL SURVEY
RESTON, VA. 22092

79018CRU

MEMO TO: Red Bailey

FROM: Ken Bayer KAB.

SUBJECT: Cruise report

DATE: September 18, 1979

1. Ship's name: Seismic Explorer (Whitehall Corp).
2. Cruise Number: Ask John Behrendt or Mahlon Ball.
3. Parent Project: " " " " " "
4. Area of Operations: Charleston, S.C.
5. Start & End of Cruise: July 20-Aug 5, 1979.
6. Chief Scientist: Ken Bayer
7. Ship's Captain: Tom Horsfield
8. Purpose of Cruise: Shallow CDP seismic studies.
9. Navigation: Sat/Nav & Doppler-sonar
10. Instruments: Geosource MDS-10 with Galvo/camera
    Fathometer, Raytheon
    Section Plotter LSR-1811
    3200 M. Streamer with 21 air guns
11. (a) No. days at sea: 17 days
    (b) No. of Km. of profile: 474.3 See pg. 7. attached.
    (c) No. of stations: about 474.3x20 " " " "
    (d) No. of dives: " " " "
    (e) Station info.: " " " "

Attachments

One Hundred Years of Earth Science in the Public Service

*SEISMIC CDP PROFILING. — CHARLESTOWN, S.C. (1)

DEPARTED RESTON, VA. 0500 (A.M) ON TUES. JULY 17.
ARRIVED ATLANTIC CITY 1000 A.M " " " ".
NO SHIP. CALLED BILL ROUTEN (WHITEHALL REP. IN ATL CITY)
SHIP ARRIVED TUES. NIGHT. I STAYED ASHORE.
PAID $10.75 FOR GAS. PD $4.50 TOLLS. PD $0.50 PHONE.
MEALS $15. (AVER. DINNER MEAL IS BETWEEN $15 TO $10.!!)
WED. JULY 18. SHIP NOW AT CAP'T STARNS PIER.
CONSERVATION BOYS TOOK THE CAR & RETURNED TO WASH.
NO MEALS ON THE SHIP. HAD TO EAT OUT.
TAXIS $6.00 MEALS $14.00 GRATUITIES $1.50
THURS. JULY 19. STILL AT ATLANTIC CITY, N.J.
BILL ROUTEN (WHITEHALL REP) TOOK ME OUT TO DINNER
ON MY 63rd. BIRTHDAY. CAP'T TOM HORSFIELD, "SEISMIC EXPLORER"
FRIDAY JULY 20. SET SAIL AT 1:30 A.M., HEADED
SOUTH. ABOUT 7:30 A.M. A FIVE MAN CREW STARTED
CHANGING THE 50 METER STREAMER SECTIONS.
6 HAD TO BE CHANGED. THEY HAVE NO QUICK
COUPLING CONNECTORS AND IT TAKES ABOUT ONE HOUR
TO MAKE ONE CHANGE. MOST COMPANIES LIKE GSI
DILICON, TELEDYNE ETC., IT TAKES NOT OVER 10
MINUTES TO CHANGE A SECTION VS 1 HOUR, UNDER
THIS PHYSICALLY DEMANDING METHOD. I NOTICE
THEY DON'T CHECK EACH REPLACED SECTION FOR
CONTINUITY ETC., BEFORE MOVING ON TO THE NEXT!
I DON'T UNDERSTAND WHY THIS WASN'T DONE WHILE
IN PORT FOR 2 DAYS, RATHER THAN AT SEA
WHILE THE SHIP IS AT SEA USING FUEL? THE CREW
WORKED ALL DAY & NIGHT ON THE STREAMER SECTIONS
AND THE AUTOMATIC DEPTH CONTROLLERS.
SAT. JULY 21ST. THE TUNED AIR GUN ARRAY OF 21 GUNS
(11 PORT, 10 STARBOARD) IS A UNIQUE SET-UP THAT RUNS
ON 2 TROLLEY TRACKS. OTHER THAN THEIR ANTIQUATED
STREAMER COUPLING METHODS, THE ENERGY SOURCE TO
NAVIGATION TO RECORDING TECHNIQUES LOOKS VERY
GOOD. THE AUTOMATIC TO MANUAL DEPTH CONTROLLER
CRT SYSTEM IS QUITE INTRIGUING.

* NOTES OF KEN BAYER ABOARD THE M/V SEISMIC EXPLORER: JULY 20 — AUG. 5, 1979.

SAT. JULY 21. (CONT.) WE ARE PRESENTLY OFF CAPE MAY, N.J., TO RUN A LINE FOR CONSERVATION OUTSIDE DELAWARE RIVER ENTRANCE. STARTED THE LINE AT 6:28 A.M (L.T.) AFTER HALF HOUR OF SHOOTING WE HAD A HUMAN TAPE LOADING ERROR & HAD TO CIRCLE. STARTED AGAIN AT 10:30 A.M & COMPLETED THE LINE AT 4:30 P.M. STARTED FOR THE CHARLESTON S.C., OFF-SHORE CDP PROFILING AT 5:30 P.M. LINE JUST COMPLETED IS D-102 (3½ hr

SUN. JULY 22. EN ROUTE TO CHARLESTON S.C. PASSED CAPE HATTERAS ABOUT NOON. WENT OVER OUR UP-COMING PROGRAM WITH THE SKIPPER & P.M. TOM HORSFIELD AND THE CHIEF OPERATOR CARL HUTCHINS. RAN THRU SOME LOCAL STORMS, MODERATE SEAS. SCHOOL OF 7 PORPOISE WERE WITH US FOR AWHILE.

MON. JULY 23. MODERATE SEAS AGAIN, LOCAL SHOWERS. THIS VESSEL IS QUITE SLOW WITH A TOP SPEED OF 10 KNOTS, EVEN WITH TWIN SCREWS. HOWEVER IT IS A GOOD RIDING SHIP. QUITE CLEAN, GOOD QUARTERS AND A NICE WORKING COMPLIMENT OF 20 PERSONNEL. WE REACHED LINE CH 2 AT NOON, AND MOVED SW OVER TO LINE CH-1 (THE LINE NEAREST TO AND PARALLEL TO SHORE). AS THE WATER IS VERY SHALLOW (~30 FT.) ALONG THIS LINE WE DECIDED TO RUN OVER THE LINE AND MONITOR THE BATHYMETRY AS WE SAILED FROM NORTH TO SOUTH. PASSED THE CHARLESTON S.C., SHIP CHANNEL ABOUT 2 P.M. SOME TRAFFIC, BUT NOT LIKE THE DELAWARE. HAD AN AIR-COMPRESSOR MOTOR FREEZE UP SO WE REQUESTED A PILOT & HE BROUGHT THE SHIP INTO CHARLESTON. WE DOCKED ABOUT 9 P.M.

TUES. JULY 24. HAD THE MOTOR REPAIRED THIS MORNING AND DEPARTED FROM CHARLESTON AT 1 P.M. FAIRLY ROUGH SEA AS WE HEADED FOR LINE CH3. STARTED TO LAY OUT THE STREAMER AT 6 P.M. 1ST POP ON L-CH-3 WAS AT 9:56 P.M.

TUES. JULY 24. WE'RE OPERATING AT 1900 PSI, WITH ABOUT 2000 in³ ON THE (21) AIR GUNS AND RECORDING 64, FIFTY METER CHANNELS OF DATA. STREAMER DEPTH ABOUT 30 FT. NOISE TESTS, GUN PRESSURE, ETC., ARE ACCEPTABLE. FILTER WINDOW IS 9-62 HZ. LOW FILTER OUT WAS TO NOISY. WOULD LIKE TO SUGGEST, FOR THE FUTURE, THAT MARINE SEISMIC PROFILES BE PLANNED ON THE NOAA CHARTS, PARTICULARLY ON THE SHALLOW NEAR-SHORE SHELF PROGRAMS. BATHYMETRY ON THE USGS 2° MMPS IS NOT ACCURATE FOR THIS WORK. COMPLETED LINE CH3 AT 4:47 A.M. ON WED JULY 25. MAY HAVE A FAULT NEAR S.P. 1360 FROM NEAR-SURFACE .140 SEC'S ON DOWN. STARTED LINE CH-2 AT 9:16 A.M. ALLOWED THEM TO START THIS LINE WITH ONE GUN DOWN (36 in³). GENERALLY I DON'T APPROVE BUT THIS IS A LONG LINE & WOULD HAVE MEANT FROM 3 TO 4 HR. DELAY. MY MAIN COMPLAINT WITH WHITE-HALL IS THAT IN THE CONTRACT (ALTHOUGH WRITTEN FOR THE SEISMIC SURVEYOR) WE WERE TO HAVE AN OPTION ON THE LOW CUT FILTER 9, 6, 3 & OUT. ON THIS SHIP THEY GO FROM 9 HZ TO OUT, NO INTER-MEDIATE FREQUENCIES! WE ARE NOT RECORDING SIGNIFICANT DATA AT DEPTHS OF 7 TO 12 SEC'S. I'M WONDERING IF THE LACK OF LOW FILTER CONTROL WITH THIS SET OF INSTRUMENTS COULD BE FILTERING OUT LOW FREQUENCY DEEP REFLECTION ENERGY? LAST SHOT ON CH-2 WAS 10:44 P.M. AFTER COMPLETING THE LINE I HAD THEM EXTEND IT FOR 1.6 KM. WITH THE LOW FILTER OUT. (SP. 2753-2784). THE MONITOR DID NOT SHOW ANY IMPROVEMENT ON THE DEEPER SECTION > 5.0 SEC'S. IT'S PRACTICALLY IMPOSSIBLE TO GEOLOGICALLY EVALUATE A SEISMIC PROFILE FROM A SINGLE TRACE RECORDING TAKEN EVERY ONE OR TWO KILOMETERS.

THURS. July 26. WORKING ON THE AIR GUNS AND NOISY 'BIRDS' MOST OF THE NIGHT WHILE MOVING UP TO LINE CH-3. STANDING BY AT 7 A.M., WAITING ON A SATELLITE. STARTED SHOOTING ON LINE CH-5 AT 10:08 A.M. TRACE H40 WAS AT THE ALLOWABLE NOISE LEVEL LIMIT BUT I LET THEM CONTINUE. WILL WATCH THIS AS WE MOVE SHOREWARD. GOOD DEPTH ON THE STREAMER OF ABOUT 40 FT. ALL GUNS ARE POPPING! 1900 PSI 21 GUNS AT 2183 in³. THE 2nd LARGEST GUN (303 in³) MALFUNCTIONED AT S.P 480; JUST UNDER THE 15% ALLOWABLE. TRACE H40 WAS ERRATIC BUT ACCEPTABLE MOST OF THE TIME AND GOOD AT THE END. LAST SHOT WAS AT 3:08 P.M. STARTED ON THE SOUTH END OF LINE CH-4 AT 10 P.M., HOWEVER, ABOUT 1/2 KM., BEFORE THE START OF CH-4 ONE OF TWO COMPRESSOR ENGINES STARTED THROWING OUT OIL AND EVERYTHING HAD TO BE ABORTED. STARTED TO REEL EVERYTHING IN AT 11 P.M., AND AT MIDNIGHT HEADED IN TO SHORE.

FRI. July 27. DOCKED AT THE SAME PIER IN CHARLESTON S.C., AT 11 A.M. THIS MORNING. BY LUNCH-TIME 3 DIESEL MEN FROM CHARLESTON STARTED TO OVERHAUL THE ENGINE.

SAT. July 28. OVERHAUL WAS COMPLETED AT 11 P.M., & TEST RUNS COMPLETED BY MIDNIGHT.

SUN. July 29. PRESENTLY WAITING FOR A REPLACEMENT ENGINEER. THE ONE WE HAD TOOK OFF AS SOON AS WE DOCKED ON FRIDAY. WE DID TAKE ON ANOTHER OBSERVER. WE ONLY HAD 3 AND REQUIRE 4. ALL POWER WENT OFF ON THE SHIP AT 12:30 P.M. CAME ON AGAIN AT 1 P.M., HOWEVER PROBLEMS HAVE NOW DEVELOPED WITH THE SAT-NAV COMPUTER AND I DOUBT WE WILL LEAVE AT 5 P.M AS SCHEDULED. THE ONBOARD OPERATORS FAILED TO CORRECT OUR COMPUTER-NAVIGATION PROBLEMS AND WE HAD TO CALL IN A HEWLITT PACKARD TECHNICIAN FROM COLUMBIA, S.C.

MON. JULY 30. TWO OUTSIDE TECHNICIANS CAME ON BOARD TODAY; ONE TO FIX THE CRT DISPLAY UNIT AND MOST IMPORTANT AT NOON THE TECHNICIAN FROM COLUMBIA TO CHECK-OUT THE SAT-NAV. COMPUTER. IN TWO HOURS HE HAD THE INSTALLED & REPLACEMENT UNITS OPERATIONAL. ONE 'CHIP' HAD TO BE REPLACED! DEPARTED FOR THE SOUTH END OF LINE CH-1 AT 5 P.M. ARRIVED AT 9 P.M AND STARTED ALL TESTS AND DEPLOYING THE STREAMER. TRACE 29 HAD A HOLE & HAD TO BE REPLACED.

TUES. JULY 31. HAD TO WORK ALL NIGHT TO CORRECT A MALFUNCTION IN ONE OF TWO STRETCH SECTIONS NEAR THE SHIP. IT WAS NOT REPLACED SIMPLY REMOVED WHICH OF COURSE WILL CHANGE THE SOURCE TO RECEIVER PARAMETERS. FIRST SHOT ON LINE CH-1 WAS AT 8:45 A.M. CH-1 COMPLETED AT 3:06 P.M. HAD TO PLACE AN APPROX. 7° BEND IN THE LINE TO AVOID SHALLOW H2O & BUOYS. STARTED ON LINE CH-6 AT 7:43 P.M., FROM SHORE TO SEAWARD. HAD TO MOVE THE LINE TO AVOID A SHIP, SOON AFTER STARTING.

WED. AUG. 1. COMPLETED LINE CH-6 AT 0106 A.M. STARTED LINE CH-4 AT 7:06 A.M. NAVIGATION WENT OUT AT 11:20 A.M., WITH 8 KM. TO COMPLETE THE LINE AND PROJECT. STARTED ON S.P. 869-A (LINE CH-4) AT 7:25 P.M. COMPLETED THE LINE & PROJECT AT 8:21 P.M. ALL EQUIPMENT ON BOARD AND EN ROUTE TO ST. PETERSBURG FLA. AT 11:45 P.M.

THURS. AUG 2. EN ROUTE TO ST. PETERSBURG, FLA. PASSED WITHIN 7 MILES OF THE TENNECO RIG, PRESENTLY DRILLING ABOUT 50 MILES EAST OF JACKSONVILLE, FLA.

FRI. AUG. 3. PASSED WEST PALM BEACH AT 10 A.M. SPEED (DUE TO GULF STREAM EFFECTS) GRADUALLY DECREASED FROM 11 TO 8 KNOTS. PASSED MIAMI AT 5 P.M. HEADED FOR THE PASSAGE WEST OF KEY WEST.

SAT. AUG 4. SOUTH OF KEY WEST AT 7 A.M., AND SAILED JUST EAST (HEADED NORTH) OF THE DRY TORTUGAS AT NOON.

SAT. AUG. 4. (CONT.) HAD A "CABLE PARTY" THIS AFTERNOON FROM 2:30 P.M TO MIDNIGHT. THE STREAMER EVIDENTLY HAD BEEN SPOOLED ON THE REEL VERY LOOSELY AND UPON DEPLOYMENT IT WOULD CURL BACK ON ITSELF MAKING IT A SLOW, CAUTIOUS TASK TO UNRAVEL. THIS, OF COURSE, CAN HAPPEN TO ANY CREW BUT DOES SUGGEST INEXPERIENCE AND/OR LACK OF SUPERVISION!

SUN. AUG. 5. STARTED UP AGAIN FOR TAMPA, AT MIDNIGHT. ABOUT 260 KM. TO GO TO THE ENTRANCE. PICKED UP THE PILOT AT 1:30 P.M., AND DOCKED AT TAMPA BAY AT 5:30 PM.

MON. AUG. 6. DEPARTED TAMPA FLA VIA DELTA AT 3:15 P.M. ARRIVED RESTON, VA. 8:30 P.M.

IN CLOSING: WE COMPLETED A PROJECT IN 13 DAYS THAT NORMALLY SHOULD HAVE ENTAILED ABOUT HALF THAT TIME. WEATHER AND SURPRISINGLY SHIP TRAFFIC AND ITINERANT FISHING VESSELS WERE NOT SIGNIFICANT DELAYING PARAMETERS. MECHANICAL FAILURES (MOTOR/POWER), EXCESSIVE STREAMER REPAIRS, WAITING ON AN ACCEPTABLE SATELLITE AZIMUTH AND LONG DISTANCES BETWEEN LINES WERE THE PRINCIPAL SLOW-UPS (SEE PG. 7). ALTHOUGH WE ONLY PAY FOR KM. OF PROFILING AND ONLY THE GOV'T 'BIRD-DOG' GETS "P.O'ed."; THE FACT REMAINS THAT "WHITEHALL" STILL DOES NOT HAVE IT'S ACT ALL TOGETHER! AS FAR AS DATA ACQUISITION LETS WAIT UNTIL THIS FINAL LEG (EAST GULF OF MEXICO) IS COMPLETED AND GET AN EVALUATION FROM RAY MARTIN & MAHLON BALL! IN THE FUTURE, I BELIEVE WE SHOULD ASK FOR & MORE COMPREHENSIVELY EVALUATE OUR RFP RELATIVE TO CDP PROFILING. FOR EXAMPLE, AN AIR GUN ARRAY WITH "IN STU" SPARES MUST BE ALLOCATED HIGHER POINTS THAN ONE WITHOUT (GSI VS WHITEHALL).

KEN BAYER
AUG 5, 1979.

SEISMIC EXPLORER – WHITEHALL CORP.

PORTAL TO PORTOL SHIP, DAYS V. 1979

#	DATE	PRODUCTIVE – CDP	~ KM.	PRODUCTIVE HOURS.	NON-PRODUCTIVE	REMARKS.
					I ARRIVED IN ATLANTIC CITY, N.J. AT 10 A.M ON 7-17	
					SET SAIL FROM ATLANTIC CITY, N.J. 0130 A.M.	CABLE REPAIRS
F 1	7-20				LINE D-102 FOR CONSERVATION. EN ROUTE TO CHARLESTON	
S 2	-21	6:28 A.M. START. COMPLETE 4:30 P.M.	31.4 KM	10	EN ROUTE TO CHARLESTON S.C.	COMPRESSOR MOTOR N.G.
S 3	-22				ARRIVED ON L-CH-1 AT 2 P.M. DOCKED CHARLESTON 9 P.M.	
M 4	-23					
T 5	-24	9:56 P.M. 1ST POP L-CH 3.	72.2 KM	2	DEPARTED CHARLESTON 1 P.M. EN ROUTE TO L-CH-3.	
W 6	-25	4:47 A.M. EOL CH-3. 9:16 A.M-10:49 P.M. LINE CH-6	138.9	19		
T 7	-26	10:08 AM TO 3:08 P.M. FOR L-CH-5	51.5	5	10 P.M COMPRESSER LARGE DIESEL THROWING OIL. MIDNIGHT HEADED FOR CHARLESTON S.C. DOCKED AT 11 A.M.	11 P.M. PULLED GEAR DIESEL DOWN
F 8	-27				WORKING ON THE DIESEL ENGINE. COMPLETE AT 11 PM.	
S 9	-28				WAITING ON AN ENGINEER. SAT-NAV. COMPUTER DOWN	
S 10	-29				COMPUTER REPAIRED BY H.P. ENG. AT 2 P.M. LEFT CHARLESTON AT 5 P.M.	
M 11	-30					
T 12	-31	LINE CH-1. 8:15 A.M. TO 3:06 P.M. & LINE CH-6 7:43 PM TO, *	72.2	7	WORK ON STREAMER.	
W 13	8-1	0106 A.M. & LINE CH-4, 7:06 A.M-11:20 AM	54.8 53.3	5	NAV. OUT AT 11:20 A.M. ON CH-4. ON LINE AT 7:25 P.M.	PROJECT COMPLETE AT 11:45 PM
T 14	-2				EN ROUTE TO ST. PETERSBURG FL.	
F 15	-3				" " " " " "	
S 16	-4				" " " " " " . 9 1/2 HR'S REPAIR STREAMER.	
S 17	-5				ARRIVED TAMPA BAY AT 5:30 P.M.	
M 18	-6				DEPARTED TAMPA 3:15 P.M. ARRIVE RESTON, VA. 8:30 P.M.	
T 19					REMARKS: 13 DAYS TO COMPLETE 474.3 KM. OF SEISMIC PROJECT;	
W 20					$\frac{474.3}{13}$ = AVER. OF 36.5 KM/DAY.	
		GEOLOGICAL CONS. TOTALS: (APPROX.)	474.3	48		
		GEOLOGIC ONLY: " "	442.9	38	$\frac{48 \text{ HRS}}{13 \times 24 \text{ HR'S}}$ = 15.4% OF TOTAL TIME PROFILING.	
		474.3 ÷ 48 = 9.9 KM./PRODUCTIVE HR.				

* LINE CH-4 CIRCLE DUE TO NAV. DOWN FROM 11:20 A.M. TO 7:25 P.M. LINE & PROJECT COMPLETE AT 8:21 P.M ON 8/1/79. FROM 8:21 P.M TO 11:45 P.M, PULLING IN GEAR AND LOOKING FOR TAIL-BUOY THAT WAS CUT-OFF STREAMER BY FISHERMAN!

APPROXIMATE COORDINATES OF THE 6 LINES PROFILED BY WHITEHALL CORP. (7-20-79 TO 8-1-79) CHARLESTON, S.C.

	(N.) LATITUDE	(W) LONGITUDE
CH-1A	32° 23.2'	80° 11.8'
	32° 37.7'	79° 46.6' (~7° TURN POINT) (AZ 55.7°)
CH-1B	32° 37.7'	79° 46.6' (AZ 62.4°)
	32° 44.0'	79° 32.3'
CH-2	32° 08.8'	80° 25.4'
	32° 50.7'	79° 13.0'
CH-3	32° 14.3'	80° 04.3'
	32° 36.0'	79° 26.4'
CH-4	32° 05.2'	79° 46.7'
	32° 29.0'	80° 05.9'
CH-5	32° 13.4'	79° 33.8'
	32° 36.2'	79° 52.1'
CH-6	32° 17.6'	79° 23.1'
	32° 42.8'	79° 46.1'

SHOOTING DIRECTIONS:

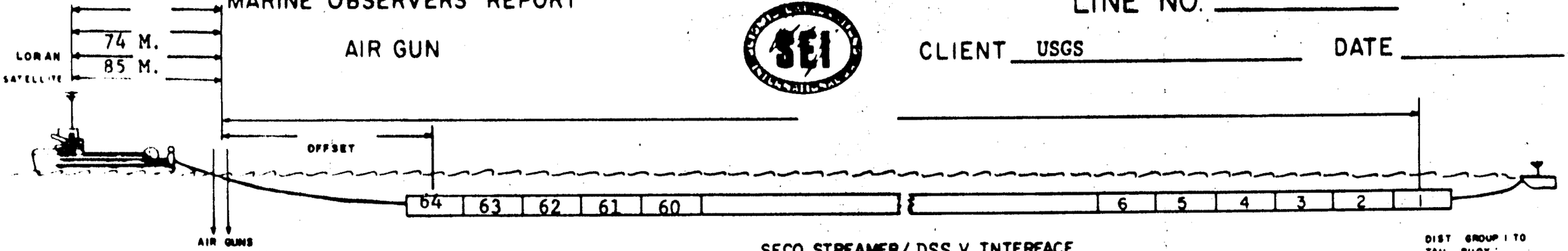
CH-1 SW TO NE
" 2 NE TO SW
" 3 SW TO NE
" 4 SE TO NW
" 5. SE TO NW
" 6 NW TO SE

MARINE OBSERVERS REPORT

LINE NO. _____

AIR GUN

CLIENT USGS DATE _____



SAT NAV ANTENNA HGT 14 M. ABOVE GEOID

SECO STREAMER/ DSS V INTERFACE

DIST GROUP 1 TO TAIL BUOY: 200 M.

AREA Charleston LOCATION East coast, USA

MOTOR VESSEL SEISMIC EXPLORER DIRECTION RECORDED _____

NO OF ACTIVE SECTIONS 32 ACTIVE SECTION LENGTH 100 M. GEO./GRP 64

DISTANCE FROM CENTER OF SOURCE TO CENTER OF NEAR STATION _____

GROUP INTERVAL 50 M. S.P. INTERVAL 50 M. POP INTERVAL 50 M.

NO AND VOLUME OF AIR GUNS 21/2183 Cu. In.

AIR GUN DEPTH 7 M.

NAVIGATION Satellite Navigation/Doppler Sonar with Loran C

REMARKS All times GMT

REFERENCE VOLTAGE: _____ uv

1st SP _____ FILE # _____ REEL # _____ TIME: _____ GMT

LAST SP _____ FILE # _____ REEL # _____ TIME _____ GMT

CLIENT REPRESENTATIVE: Ken Bayer

INSTRUMENTATION

RECORDING INSTRUMENTS GEOSOURCE MDS-10

TIME ZERO DELAY 25 ms.

TAPE FORMAT SEG 'B' RECORD LENGTH 12 secs.

MULTIPLEX: 32 __ 64 __ 128 X BPI 1600 SAMPLE RATE 4 Ms.

GAIN MODE IFP GAIN CONSTANT _____ dbs

HC FILTER 62 Hz Slope 80 db/oct. LC FILTER OUT Hz Slope OUT db/oct.

STREAMER SENSITIVITY _____ uv/ub

SYSTEM POLARITY: circle appropriate term

Geophone Output		Digital Tape		Camera Monitor		Section Plotter	
+	−	+	−	up	down	black	white

REMARKS: Time break overide: 64 ms.
Fathometer recordings draft compensated

FATHOMETER: TYPE Raytheon Bathymetric DEPTH 4 M.

MAGNETOMETER TYPE _____ DEPTH _____

SUB-BOTTOM PROFILER: _____

SECTION PLOTTER Tr 64 Each 1 Pop. 4 Secs.

TYPE Raytheon LSR-1811

TAPE CHANNEL ASSIGNMENT

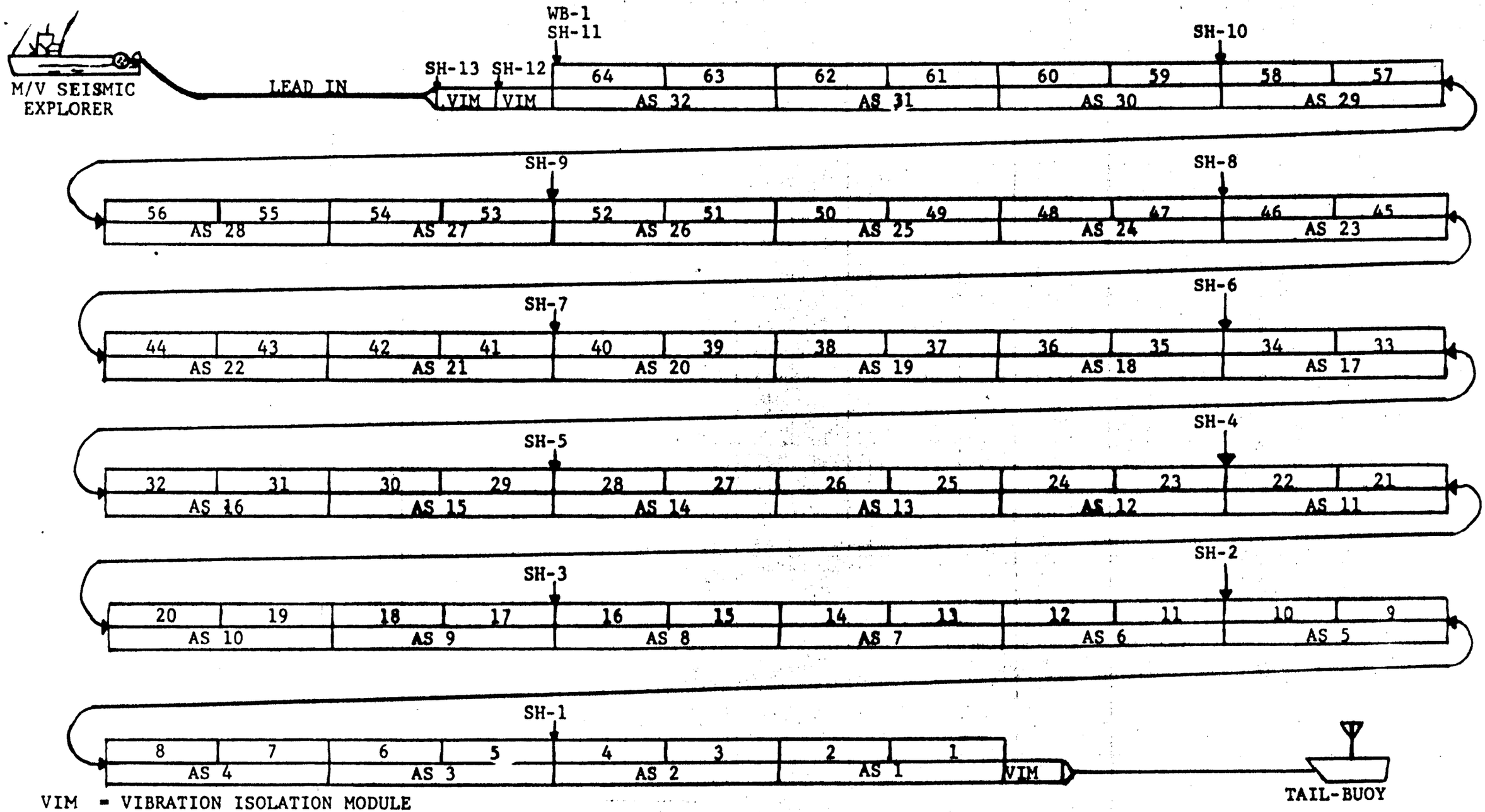
Channel(s)	INFORMATION
1-64	Seismic Data
Aux. 1	Timing Word
Aux. 2	W/B Sum
Aux. 3	Time Break
Aux. 4	Gun Phone Sum
Aux. 5	50 Hz.

Monitor Record Every 20 Pop

MONITOR TRACE ASSIGNMENT

Trace(s)	INFORMATION
1-48	Seismic Data
49	TIME BREAK
50	Gun Phone Sum
51	W/B Sum
52	File Number
53	50 Hz.

OBSERVER _____



VIM = VIBRATION ISOLATION MODULE
AS = ACTIVE SECTION
1-64 = 50 METER GROUPS
SH = SEAHAWK DEPTH CONTROLLER
WB = WATER BREAK

SAVANNAH

MAPPED, EDITED, AND PUBLISHED BY THE U. S. GEOLOGICAL SURVEY AND THE NATIONAL OCEAN SURVEY

Original topographic map prepared by the Defense Mapping Agency Topographic Center from 1:24,000 and 1:50,000 scale maps dated 1912-1956; NOS charts dated 1936-1955; and aerial photographs taken 1951-1955. Field checked 1957. Planimetry revised by the U.S. Geological Survey from aerial photographs taken 1973, 1976 and other source data. Revised information not field checked. Map edited 1978.

Bathymetry and shoreline compiled by National Ocean Survey (NOS). Bathymetry was compiled from NOS Hydrographic Surveys (see index). Bathymetric survey data comply with International Hydrographic Organization (IHO) Special Publication 44 accuracy standards and/or standards used as of the date of the survey. Shoreline (mean high water line) was compiled from NOS tide-coordinated aerial photographs. This information is not intended for navigational purposes

Offshore protraction survey data, shown in red, compiled by the Bureau of Land Management. Heavy lines indicate limits of BLM Outer Continental Shelf Official Protraction Diagram dated September 1, 1978. The protractions on this map are not for Federal leasing purposes; for such purposes, refer to OCS Official Protraction Diagram available from the Bureau of Land Management

100,000-foot grid ticks based on South Carolina coordinate system, south zone, and Georgia coordinate system, east zone

Location of geodetic control established by government agencies is shown on corresponding 1:250,000-scale Geodetic Control Diagram

Portion of Georgia-South Carolina boundary in dispute, not shown

There may be private inholdings within the boundaries of the National or State reservations shown on this map

LEGEND

Figures in red denote approximate distances in miles between stars

POPULATED PLACES
Over 500,000 — BOSTON
100,000 to 500,000 — RICHMOND
25,000 to 100,000 — EVANSTON
5,000 to 25,000 — Newnan
1,000 to 5,000 — Bar Harbor
Less than 1,000 — Fishkill

RAILROADS (Single track, Double or Multiple)
Standard gauge
Narrow gauge

BOUNDARIES
International
State
County
Park or reservation
Spot elevation in feet .221

ROADS
Primary, all-weather, hard surface
Secondary, all-weather, hard surface
Light-duty, all-weather, hard or improved surface
Fair or dry weather, unimproved surface
Trail
Interchange
Route markers: Interstate, U.S., State (95) (29) (193)

Landplane airport
Landing area
Seaplane airport
Seaplane anchorage
Woods-brushwood
Mine
Power line
Landmark: School; Church; Other
Marsh or swamp
Approximate shoreline
Sounding datum line (uncovers)

Scale 1:250,000

5 0 5 10 15 20 Statute Miles
5 0 5 10 15 20 25 30 Kilometers
5 0 5 10 15 Nautical Miles

CONTOUR INTERVAL 50 FEET
WITH SUPPLEMENTARY CONTOURS AT 25 FOOT INTERVALS
NATIONAL GEODETIC VERTICAL DATUM OF 1929
BATHYMETRIC CONTOUR INTERVAL 2 METERS
DATUM: MEAN LOW WATER
THE RELATIONSHIP BETWEEN THE TWO DATUMS IS VARIABLE

TRANSVERSE MERCATOR PROJECTION

BLACK NUMBERED LINES INDICATE THE 10,000-METER UNIVERSAL TRANSVERSE MERCATOR GRID, ZONE 17

1978 MAGNETIC DECLINATION FROM TRUE NORTH VARIES FROM 2½° (40 MILS) WESTERLY FOR THE CENTER OF THE WEST EDGE TO 4° (70 MILS) WESTERLY FOR THE CENTER OF THE EAST EDGE

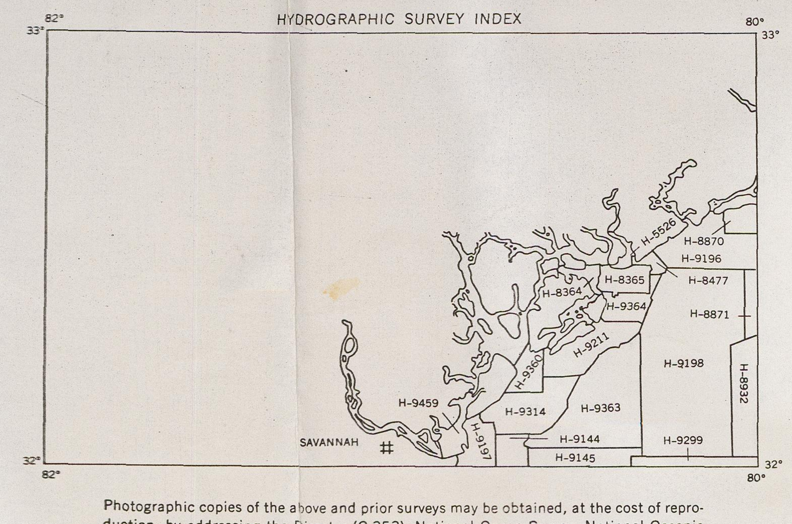
FOR SALE BY U.S. GEOLOGICAL SURVEY, RESTON, VIRGINIA 22092
OR NATIONAL OCEAN SURVEY, ROCKVILLE, MARYLAND 20852

HYDROGRAPHIC SURVEY INFORMATION

SURVEY NUMBER	SURVEY DATE	SURVEY SCALE	SURVEY LINE SPACING (NAUT. MILES)
H-5526	1934	10,000	.05-.10
H-8364	1956	10,000	.02-.09
H-8365	1956	12,500	.03-.12
H-8477	1956	10,000	.02-.15
H-8870	1965	20,000	.07-.13
H-8871	1965	40,000	.10-.15
H-8932	1968	80,000	.10-.20
H-9144	1971	40,000	.10
H-9145	1971	40,000	.10
H-9196	1971	20,000	.07-.24
H-9197	1971	20,000	.05-.12
H-9198	1971	40,000	.05-.10
H-9211	1973	20,000	.05-.10
H-9299	1973	80,000	.20-.50
H-9314	1973	20,000	.05-.10
H-9360	1973	10,000	.02-.10
H-9363	1973	40,000	.07-.10
H-9364	1973	20,000	.03-.14
H-9459	1974	10,000	.03-.07

DEPTH GRADIENT

HYDROGRAPHIC SURVEY INDEX

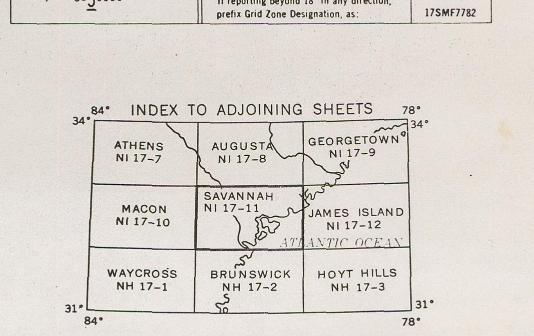


Photographic copies of the above and prior surveys may be obtained, at the cost of reproduction, by addressing the Director (C-353), National Ocean Survey, National Oceanic and Atmospheric Administration, Rockville, Maryland 20852.

INTERIOR—GEOLOGICAL SURVEY, RESTON, VIRGINIA—1978

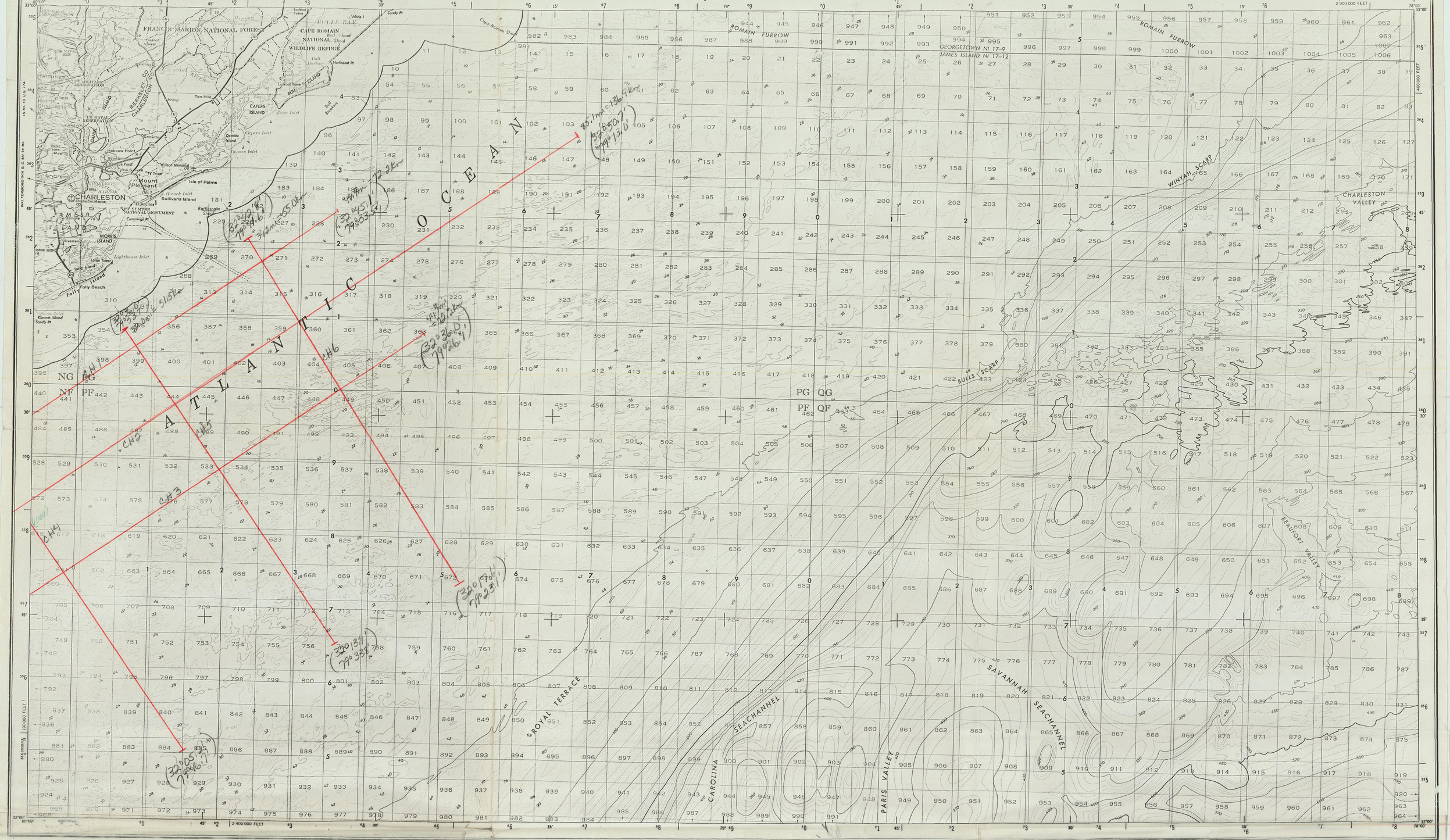
GRID ZONE DESIGNATION: 17S	TO GIVE A STANDARD REFERENCE ON THIS SHEET TO NEAREST 1000 METERS	
100,000 M. SQUARE IDENTIFICATION: MG, NG, MF, NF (360, 50)	SAMPLE POINT: STILLWELL	
	1. Read letters identifying 100,000 meter square in which the point lies:	MF
	2. Locate first VERTICAL grid line to LEFT of point and read LARGE figure labeling the line either in the top or bottom margin, or on the line itself: Estimate tenths from grid line to point:	7 7
IGNORE the SMALLER figures of any grid number; these are for finding the full coordinates. Use ONLY the LARGER figures of the grid number; example: 355̲0000	3. Locate first HORIZONTAL grid line BELOW point and read LARGE figure labeling the line either in the left or right margin, or on the line itself: Estimate tenths from grid line to point:	8 2
	SAMPLE REFERENCE:	MF7782
	If reporting beyond 18° in any direction, prefix Grid Zone Designation, as:	17SMF7782

INDEX TO ADJOINING SHEETS



The all wet Bathymetric maps shown on this index are available for sale by the National Ocean Survey, National Oceanic and Atmospheric Administration, Rockville, Maryland 20852.

SAVANNAH, GEORGIA; SOUTH CAROLINA
1957
REVISED 1978
TOPOGRAPHIC-BATHYMETRIC



MAPPED, EDITED, AND PUBLISHED BY THE U. S. GEOLOGICAL SURVEY AND THE NATIONAL OCEAN SURVEY

Topographic map compiled in 1969 by the U. S. Geological Survey from 1:24,000-scale maps dated 1958–1959, and from other sources.
Supersedes Defense Mapping Agency Topographic Center map dated 1944.

Hydrography and shoreline compiled by the National Ocean Survey (NOS). Bathymetry was compiled from NOS Hydrographic Surveys (see index), supplemented by other hydrographic sources. Bathymetric survey data comply with International Hydrographic Organization (IHO) Special Publication 44 accuracy standards and/or standards used as of the date of the surveys. Shoreline (mean high water line) was compiled from NOS tide-coordinated aerial photography.
This information is not intended for navigational purposes.

Offshore protraction survey data, shown in red, compiled by the Bureau of Land Management. Heavy lines indicate limits of BLM Outer Continental Shelf Official Protraction Diagrams dated June 11, 1975. The protractions on this map are not for Federal leasing purposes; for such purposes, refer to the OCS Official Protraction Diagrams available from the Bureau of Land Management.

100,000-foot grid based on South Carolina coordinate system, south zone

Location of geodetic control established by government agencies is shown on corresponding 1:250,000-scale Geodetic Control Diagram

There may be private inholdings within the boundaries of National or State reservations shown on this map

LEGEND

Figures in red denote approximate distances in miles between stars

POPULATED PLACES
- Over 500,000 — BOSTON
- 100,000 to 500,000 — RICHMOND
- 25,000 to 100,000 — EVANSTON
- 5,000 to 25,000 — Newnan
- 1,000 to 5,000 — Bar Harbor
- Less than 1,000 — Fishkill

RAILROADS
- Normal gauge
- Narrow gauge
- Single track Double or Multiple

BOUNDARIES
- International
- State
- County
- Park or reservation

ROADS
- Primary, all-weather, hard surface
- Secondary, all-weather, hard surface
- Light-duty, all-weather, hard or improved surface
- Fair or dry weather, unimproved surface
- Trail
- Interchange

Route markers: Interstate, U.S., State

- Landplane airport
- Landing area
- Seaplane airport
- Seaplane anchorage
- Woods-brushwood
- Mine
- Power line
- Landmark: School; Church; Other
- Spot elevation in feet — 221
- Marsh or swamp
- Approximate shoreline
- Sounding datum line — (uncovers)

Scale 1:250,000

5 0 5 10 15 20 Statute Miles

5 0 5 10 15 20 25 30 Kilometers

5 0 5 10 15 Nautical Miles

CONTOUR INTERVAL 50 FEET
WITH SUPPLEMENTARY CONTOURS AT 25 FOOT INTERVALS
NATIONAL GEODETIC VERTICAL DATUM OF 1929
BATHYMETRIC CONTOUR INTERVALS: 10 METERS TO THE 200 METER DEPTH, SUPPLEMENTED BY 2 METER INTERVALS, THENCE 50 METERS TO MAXIMUM DEPTH, SUPPLEMENTED BY 10 METER INTERVALS
DATUM: MEAN LOW WATER
THE RELATIONSHIP BETWEEN THE TWO DATUMS IS VARIABLE

TRANSVERSE MERCATOR PROJECTION

BLACK NUMBERED LINES INDICATE THE 10,000-METER UNIVERSAL TRANSVERSE MERCATOR GRID, ZONE 17

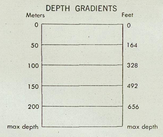
1969 MAGNETIC DECLINATION FROM TRUE NORTH VARIES FROM 2°36' (43 MILS) WESTERLY FOR THE CENTER OF THE WEST EDGE TO 3°14' (62 MILS) WESTERLY FOR THE CENTER OF THE EAST EDGE

FOR SALE BY U. S. GEOLOGICAL SURVEY, RESTON, VIRGINIA 22092
OR NATIONAL OCEAN SURVEY, ROCKVILLE, MARYLAND 20852

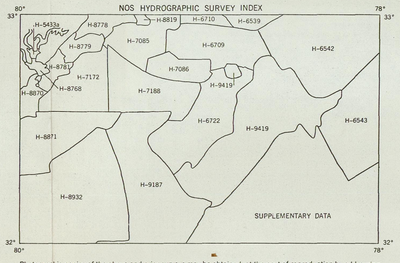
HYDROGRAPHIC SURVEY INFORMATION

SURVEY NUMBER	SURVEY DATE	SURVEY "SCALE	SURVEY LINE SPACING (NAUT. MILES)
H-5433a	1933-34	1:10,000	.25–.50
H-6539	1940	1:80,000	.30–.80
H-6542	1939	1:80,000	.50–2.0
H-6543	1940	1:80,000	.03–.50
H-6709	1941	1:80,000	.20–1.0
H-6710	1941	1:40,000	.15–.48
H-6722	1941	1:80,000	.10–1.0
H-7085	1945-46	1:40,000	.05–.25
H-7086	1946	1:40,000	.05–.45
H-7172	1946	1:40,000	.01–.30
H-7188	1946-47	1:40,000	.08–.45
H-8768	1963	1:10,000	.01–.30
H-8778	1963-64	1:20,000	.02–.12
H-8779	1963	1:20,000	.01–.30
H-8787	1964	1:20,000	.01–.70
H-8819	1965	1:20,000	.01–.13
H-8870	1965	1:20,000	.07–.13
H-8871	1965	1:40,000	.08–.12
H-8932	1966	1:80,000	.15–.35
H-9187	1971	1:80,000	.50
H-9419	1974	1:80,000	.25–.50

DEPTH GRADIENTS



NOS HYDROGRAPHIC SURVEY INDEX



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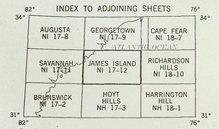
GRID ZONE DESIGNATION: 17S	TO GIVE A STANDARD REFERENCE ON THIS SHEET TO NEAREST 1000 METERS
100,000 M. SQUARE IDENTIFICATION: NG PG QG / NF PF QF	SAMPLE POINT: FORT SUMTER 1. Read letters identifying 100,000 meter square in which the point lies; 2. Locate first VERTICAL grid line to LEFT of point and read LARGE figure labeling the line either in the top or bottom margin, or on the line itself; Estimate tenths from grid line to point 3. Locate first HORIZONTAL grid line BELOW point and read LARGE figure labeling the line either in the left or right margin, or on the line itself; Estimate tenths from grid line to point.
IGNORE the SMALLER figures of any grid number; these are for finding the full coordinates. Use ONLY the LARGER figure of the grid number; example: 350000	SAMPLE REFERENCE: PG0524 If reporting beyond 18° in any direction, prefix Grid Zone Designation, as: 17SPG0524

INDEX TO ADJOINING SHEETS



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INTERIOR—GEOLOGICAL SURVEY, RESTON, VIRGINIA—1978

JAMES ISLAND, SOUTH CAROLINA

1969

TOPOGRAPHIC-BATHYMETRIC