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74/22

INSTITUTE OF GEOLOGICAL SCIENCES

GEOPHYSICAL DIVISION

GEOLOGICAL & GEOPHYSICAL TEST RANGES IN THE FIRTH OF FORTH

GP/MG/74/22

TRIALS REPORT No 1

'QUINTAIL' RECONNAISSANCE SURVEY 21 NOVEMBER-7 DECEMBER 1974

by

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IGS TRIALS REPORTS

This report is one of a series which will describe geological and geophysical tests made across a group of test ranges in the Firth of Forth. Initial surveys will be made by IGS using a wide range of equipment, after which commercial operators and equipment manufacturers will be invited to make use of the range and where possible, make test data available for distribution as reports in this series.

A set of two 1:25 000 base maps have been prepared on National Grid projection with conspicuous coastal land marks shown for visual fixing purposes. Copies are available to users of the test range.

An open file of test range data will be held in Marine Geophysics Unit, Edinburgh, for consultation purposes which will include records and documents additional to those copied for circulation in this report series.

Enquiries relating to this work should be addressed to Mrs S E Deegan, Marine Geophysics Unit, 14 Braefoot Terrace, Edinburgh EH16 6AA.

RECONNAISSANCE SURVEY 21 NOVEMBER-7 DECEMBER 1974

FIRTH OF FORTH EQUIPMENT TRIALS RANGE

OBJECTIVES

This project was designed to establish two test ranges within the Firth of Forth for geophysical and geological survey equipment. When completed the two ranges - shallow and deep water areas - will be used for testing existing IGS equipment after repair or modification prior to installation aboard major survey vessels. It is hoped that commercial manufacturers will make use of these ranges and thus provide research establishments and other interested organisations with previews of new equipment.

TEST RANGES

Two areas were selected and surveyed on a reconnaissance basis to determine their suitability. The first - shallow water - consists of a mile wide corridor centred on a line between Kirkcaldy Harbour Light and Fidra Light, extending from close inshore at Kirkcaldy to approximately 02^{o} 57'W. This area although in relatively shallow water is known to possess excellent seismic reflection qualities.

Area 2 consists of a corridor centred on a line from Inchkeith Lighthouse to a position half a mile south of the Isle of May. Water depths in this area are 50 metres+ and it is designed to be used primarily for the testing and evaluation of deep tow seismic/sonar systems and high energy seismic equipment.

Both areas were selected after studying data previously obtained in the Forth and it should be possible to obtain good quality results with a wide range of equipment and techniques. A further

important factor in the selection of these two areas is their suitability for use by vessels equipped with the most basic of navigation systems, it being possible during suitable weather conditions to pick out transits and sextant fixes for position fixing.

RECCE SURVEY, 21 NOVEMBER-7 DECEMBER 1974

Survey Vessel. A 50' survey vessel - QUINTAIL - was employed on this work. The vessel was equipped with a Mk 21 Decca Main Chain receiver, magnetic compass and Seafarer Radar. QUINTAIL proved to be an excellent craft for this operation as she has a large amount of deck space fore and aft and exceptionally large below decks accommodation for the installation of recording instruments. During the survey the radar set developed a fault and the compass behaved erratically, the latter may have been caused by the close proximity of high voltage sparker equipment. Although QUINTAIL is of all metal construction, little noise, electrical or acoustic, was picked up whilst running traverses. She also proved to be a good seaboat during periods of poor weather (Force 7 Beaufort).

Navigation. The position fixing method was Decca Main Chain - pattern 3B. For lines 1-7 the green and purple lanes were used giving fixes with the best cuts and smallest lane expansions. The purple transmitter was non-operational for Line 8 and this was fixed using red and green lanes with less consistent results.

Throughout the survey Main Chain reception was subject to instabilities and pattern shifts with no particular logic, but with the exception of Line 8 it has been possible to eliminate

temporary abberations and thus produce a smoothed track. No fixed error corrections were applied.

Such accuracy determinations as could be made indicate errors of probably less than 400 metres, although it was observed that there was a constant error to the south inshore near Kirkcaldy.

At times the accurate running of lines was hampered by the lack of a reliable compass, this problem being magnified during periods of poor visibility when shore objects became obscured. All lines were run using visual transits.

Charting. Rough plotting was done on a 1:25 000 compilation of the relevant portions of the standard IGS series 1:100 000 UTM Base and Decca lattice charts. There was some distortion introduced by the photo enlargement and splicing process. This 1:25 000 compilation sheet covers the Firth of Forth from Inchkeith to the Isle of May and is available for future work.

Final plotting is on base sheets for each range compiled from the lattice plotting sheet and therefore contain similar distortion.

Results. In all, 8 lines were run. Numbers 1-7 were over the Kirkcaldy Bay range (shallow water) and Line 8 over the Isle of May range (deep water).

Lines 1 and 2 were run using the Edo Western pinger system (515 recorder) and a sample of Line 2 is included. Lines 3-7

were low energy sparker (1000 joules) and Lines 4 and 5 are also included in this report. With the exception of Line 2, used for experimental purposes and cut short due to rapidly deteriorating weather conditions, record quality in the Largo Bay area is good.

Line 8, run over the Isle of May range was not very successful. This was entirely due to bad weather conditions and the line would not have been attempted if more survey time had been available. However, the data obtained indicates that the area selected for deep water work will prove to be satisfactory.

PROJECTED WORK 1975

27.2.75-12.3.75	Drilling
	Engineering Studies (experimental)
	Borehole geophone survey (experimental)
	Geophysical borehole logging
15.4.75-15.5.75	Trials with Motorola Mini Ranger III navigation system.
	Trials Huntec Boomer System
	Trials Klein Sonar
	Shallow Refraction Experiment
	Additional Geophysical Traverses over Ranges
	Establishment of Largo Bay Range
Date to be fixed	Trials of Deep Tow Sparker System

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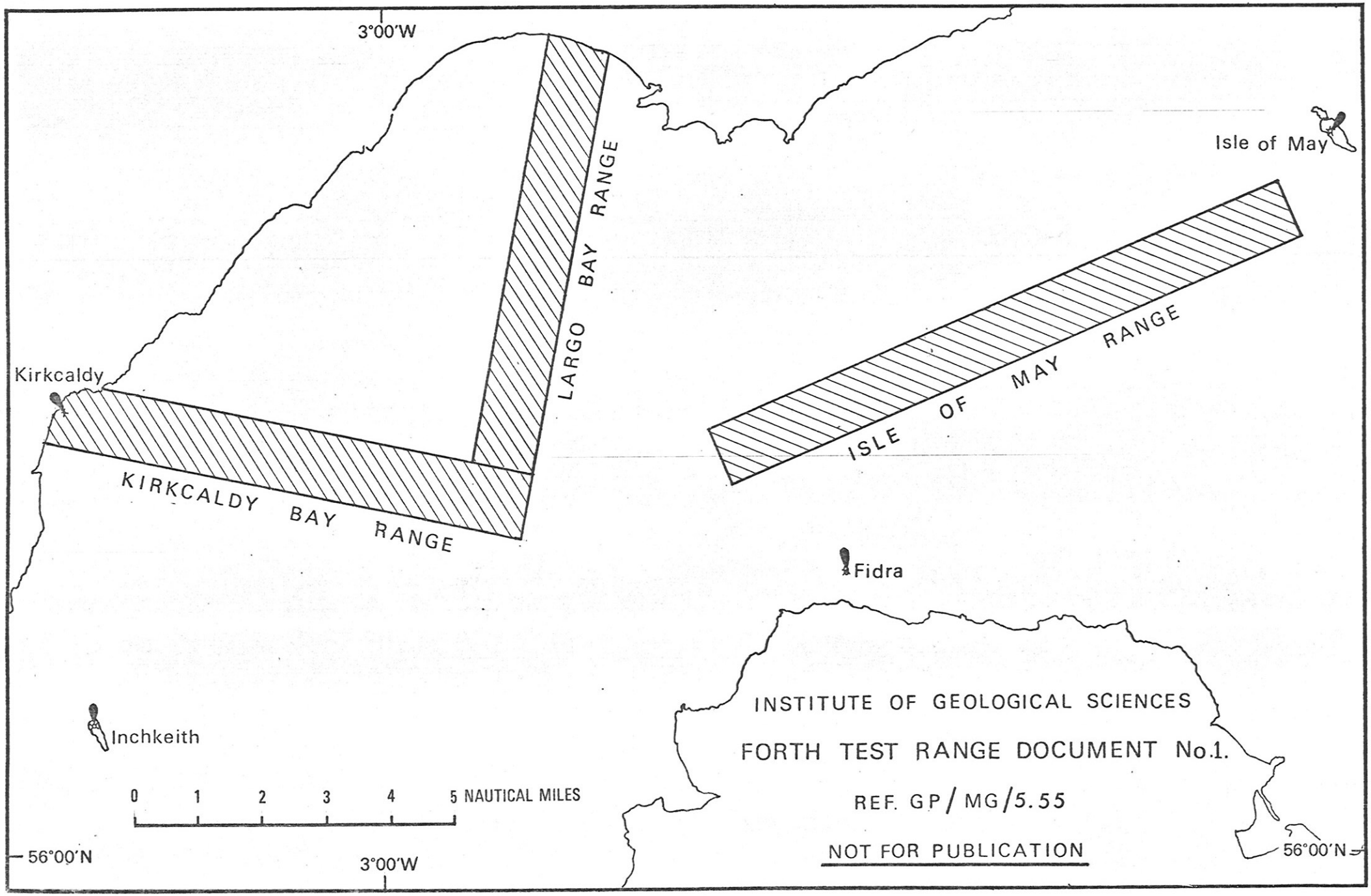
FORTH TEST RANGES GP/MG/5.55

DOCUMENT NO.	
1	LOCATION DIAGRAM OF TEST RANGES.
2	LOCATION MAP OF PINGER LINE 1 AND SPARKER LINES 4 and 5.
3	EXAMPLE PINGER RECORD LINE 1 FIXES 1-20.
3A	EXAMPLE PINGER RECORD LINE 1 FIXES 40-49.
4	EXAMPLE SPARKER RECORD LINE 4 COMPLETE.
5	EXAMPLE SPARKER RECORD LINE 5 COMPLETE.


3°00'W
Isle of May
LARGO BAY RANGE
ISLE OF MAY RANGE
Kirkcaldy
KIRKCALDY BAY RANGE
Fidra
Inchkeith
0 1 2 3 4 5 NAUTICAL MILES
56°00'N
3°00'W
56°00'N
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FORTH TEST RANGE DOCUMENT No.1.
REF. GP/MG/5.55
NOT FOR PUBLICATION