INSTITUTE OF GEOLOGICAL SCIENCES
CONTINENTAL SHELF UNIT II
WEST GRANTON ROAD, EDINBURGH EH5 1JA

TELEPHONE: 031-552 4232

REPORT NO. 75/17

CSU II Report

WHITETHORN CRUISE 75/WH/05

MALIN SEA

4 - 21 September 1975

by

D Evans

Report dated 3rd October 1975

75/WH/05 Cruise Report

Malin Sea 4 - 21 September 1975

Personnel: D Evans (CSU II)
J M Dean (CSU II)
R S Sutherland (CSU II)

Object of Cruise

The primary aim of the cruise was to drill boreholes to prove the age and nature of sediments infilling the Rathlin trough and Loch Indaal basin. A secondary objective was to conduct geophysical and sampling surveys should conditions be unsuitable for drilling.

Cruise Diary

Thursday 4th		Ardrossan Harbour.
	1500	Leave berth and steam to site 285 off Lough Foyle.
Friday 5th	0130	Arrive at site 285 and drop ship's anchor to allow work on vibrocorer.
-	0630	Laying anchor pattern, standby for swell to decrease.
	1600	Drilling begins on Borehole 75/39.
Saturday 6th		Drilling continues.
Sunday 7th		Drilling continues.
	0900	Drilling abandoned after reaching rockhead.
	1300	Lift anchors proceed to site 282.
	1800	Lay anchors but very strong tides prevent drilling. Standing by.
Monday 8th	0600	Lift anchors and steam to Sound of Jura for sampling in bad weather.
	1430	Sampling in Sound of Jura.
	2030	Geophysics in Sound of Jura.
Tuesday 9th	0650	Pull in geophysics gear, steam to site 231.
	0745	Lay anchors on site 231, unsuccessful.
	1230	Second attempt at laying anchors on site 231 successful, and begin drilling Borehole 75/40.
Wednesday 10th	0415	Cease drilling and lift casing.
	1115	Anchors aweigh and steaming for site 229 in Loch Indaal.
	1730	Anchored up and drilling Borehole 75/41.
Thursday 11th		Drilling Borehole 75/41.

Friday 12th		Drilling Borehole 75/41.
	1110	Cease drilling and lift casing.
	1715	Anchors lifted and steam to site 230, but excessive swell prevents laying of anchors.
	2000	Begin geophysics in Loch Indaal.
Saturday 13th		Continue geophysics.
	0630	Pull in gear and steam to site 230 and anchor up.
	1245	Spud in on site 230, Borehole 75/42.
Sunday 14th		Drilling Borehole 75/42.
	0715	Terminate hole and lift casing, weigh anchors.
	1100	All anchors recovered and steam to site 287.
	1415	All anchors down and begin drilling 75/43.
Monday 15th		Drilling continues.
	2000	Swell and wind cause abandonment of difficult hole. Remain at anchor.
Tuesday 16th		At anchor.
	1130	Swell decreased, pull vessel back onto position.
	1245	Spud in Borehole 75/44.
Wednesday 17th		Drilling Borehole 75/44.
Thursday 18th		Drilling Borehole 75/44.
	1115	Drilling ceased and pull out of hole. Stowing of gear proceeding.
	1945	Anchors aweigh and put down ship's anchor to finalize preparations for sea.
	2200	Lift anchor and steam for Sound of Jura.
Friday 19th		Steaming for Sound of Jura.
	0120	Begin geophysics.
	0830	End geophysics and pull in gear - pinger lost. Steam for Stornoway to collect water.
Saturday 20th	0800	Tie up at Stornoway, strong winds.
	1530	Leave Stornoway and steam for Aberdeen.
Sunday 21st		Steaming for Aberdeen.

Brief Resume of Results (See Track Charts, Figs I,II and III)

Altogether five borehole sites were drilled, 75/43 and 75/44 being on one site. Brief logs of these boreholes are presented in Appendix I. Of these bores the chalk and red sandstone of 75/39 and 75/40 respectively were predictable, but the grey mudstones in Loch Indaal (75/41, 75/43 and 75/44) had not been expected. Preliminary examination of the cores indicates a Keuper-Rhaetic-Liassic succession in the basin. Also of considerable value were the large number of drift samples collected, including 12 U4s. This material should provide good palaeontological data for precise dating of the late-postglacial clays. Sediments were also obtained from routine sampling.

The geophysical work has provided a more detailed knowledge of the structure of both the Loch Indaal basin and the northern end of the Rathlin trough. The equipment worked well and some good records were obtained.

Equipment Employed

EG & G 254 Recorder
EG & G 263C Hydrophone and summing box
Multi-electrode sparker
EG & G Power and Capacitor banks
ORE Pinger and Gifft Recorder
Atlas Deso echosounder
Gravity Corer - sediment barrel
- rock barrel
Shipek grab

APPENDIX I BOREHOLE SUMMARY LOGS

Borehole 75/39 - off Lough Foyle

Water Depth 16m

	Thickness		Depth from Surface	
	M	Mm	M	Mm
Modern sand with cobbles at base.	14	00	14	00
Clay, some silt, soft at top becoming tougher downwards.	22	00	36	00
?Till, greyish brown, fragments largely chalk Small boulders including dolerite at base.	25	10	47	10
Chalk with flints.	2	50	49	60

Borehole 75/40 - Sound of Jura

Water Depth 43m

	Thickness		Depth from Surface	
	M	Mm	M	Mm
Clay, medium grey with dark grey lamination, some shells and occasional pebbles. Soft but increased plasticity down.	21	00	21	00
Clay, greyish brown, unlaminated, plastic.	2	00	23	00
?Till, reddish brown silty clay matrix with gravel and pebbles.	2	00	25	00
Red sandstone and conglomerate. Coarse-fine xst sst with quartzite cobbles up to 10 cms in one unit.	10	70	35	70

Borehole 75/41 - Loch Indaal, Islay

Water Depth 26m

	Thickness		Depth from Surface	
	M	Mm	M	Mm
Sandy gravel , peebles and cobbles	1	00	1	00
Clay, grey brown,plastic	14	00	15	00
Silty clay quartzite pebbles (Till)	2	80	17	80
Mudstone, silty in places dark grey generally well laminated, Thin beds limestone, siltstone and sandstone. Burrows,abundant marine fauna, mainly bivalves,fish fragments (Rhaetic)	12	57	30	37
Mudstone, pale greyish green, Rare traces lamination. Mottled purple and red near base. (?Tea Green Marl)	10	38	40	75
Mudstone chocolate brown, mainly massive, occasional green mottling especially at top	5	55	46	30

Borehole 75/42 - Loch Indaal, Islay
Water Depth 42m

	Thickness M	Thickness Mm	Depth from Surface M	Depth from Surface Mm
Clay, dark brown, plastic, slightly calcareous occasional stones	4	00	4	00
Clay with sand to cobble material red/brown. (?Till)	1	00	5	00
Mudstone, with laminae and beds up to 1.8cm. siltstone to coarse sandstone Calcareous in places. Gypsum common in spots, stringers, beds and nodules up to 10 cms. Mainly reddish brown with green and grey mottling. Structures include dessication and synaeresis cracks, antiripples and trough cross lamination (Keuper?)	21	05	26	05

Borehole 75/43*- Loch Indaal, Islay and
Borehole 75/44*- Loch Indaal, Islay
Water Depth 27m

* Two boreholes drilled within 20 feet of each other, 75/43 having been adandoned before reaching rockhead.

Clay, soft firm very dark grey with peebles, cobbles and discrete sand lenses. Calcareous	6	50	6	50
Clay laminated very dark-med.grey. Calcareous	12	00	18	50
Clay grey brown firm to very firm with occasional gravel. Calcareous	13	50	30	00
?Till Reddish grey brown, soft matrix	01	50	31	50
?Till Very dark grey silty clay matrix with metamorphics and mudstone common constituents	03	81	35	31
Mudstone (Lias) very dark grey mudstone including limestone bands and laminae. Fossilferous including ammonites.	15	14	50	45

Palaeontological Note

Reports have been received on Macropalaeontology of Boreholes 75/41 and 75/43 and 44. In 75/41 a Rhaetic age is confirmed while in 75/43 and 44 a Sinemurian age has been established.

APPENDIX II

Copies of front page of Islay and Jura local newspaper. Clearly considerable local interest was aroused by this Whitehorn Cruise.

ILEACH

THE NEWSPAPER OF THE ISLAY COUNCIL OF SOCIAL SERVICE

Vol. 2.
No. 23.
5p
22nd September, 1975.
Every fortnight.

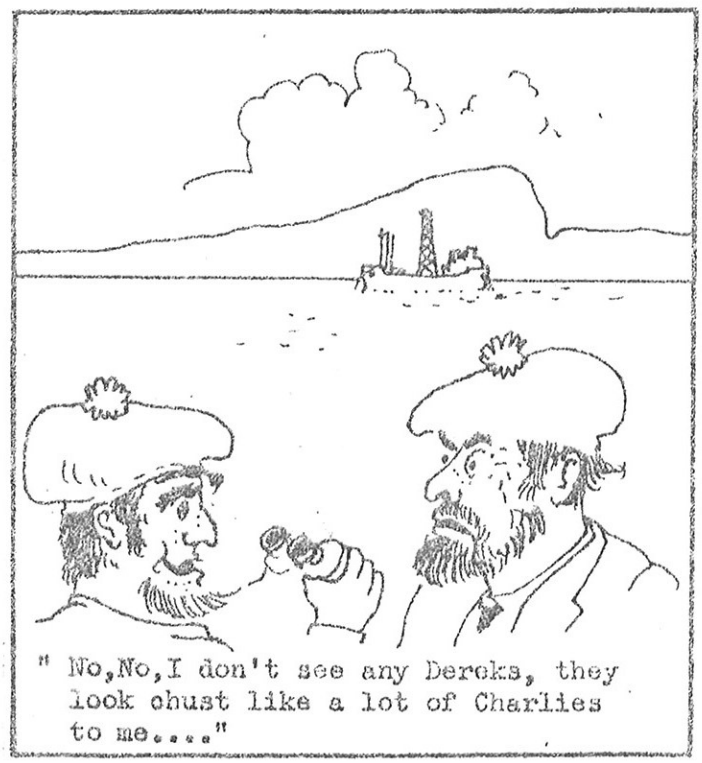
BUSINESS IN GREAT WATERS

The lights of Lochindaal have seemed much brighter for the last ten days or so, because of the mysterious presence of a pale-green ship at the mouth of the loch, apparently drilling in the sea-bed by day and night. Ileachs from almost every part of the island have been watching the ship with either suspicion or hope, according to their views on the oil industry, and some have even reported seeing flames shooting out into the night sky from the top of the derrick amid-ships. Now that the stranger has departed - leaving echoes of drillers' language reverb-erating in the tender ears of the Port Charlotte fishermen - the ILEACH can reveal the nature of its mission.
According to Dr Fannin of the Off-shore Division of the Institute of Geological Sciences in Edinburgh, the ship is the survey ship "WHITETHORN", chartered by Wimpeys on behalf of the Institute for the last five years from William Cory and Co., shipbuilders. She has been used for part of a long programme of mapping the sea-bed of the continental shelf off the West coast of Scotland, and the end result will be a number of geological maps of the sea-bed currently in preparation.

Two geophysical methods have been employed on the WHITETHORN - one to lower grab samplers to a depth of a few metres, and the other to drill to a depth of about 100 metres. The WHITETHORN is held in position by six anchors, and the drilling is carried on continuously by two drilling crews of four men each, with a foreman and a Government inspector. The geological crew of three was headed by Dr Evans, and we hope to get a report from him next week of the results of the exploration in Lochindaal.

Meantime, let us hope that the WHITETHORN made her way safely round to Aberdeen before the gales struck yesterday. We certainly miss her lights in Lochindaal.

For the last fortnight, a team of divers, RAF and civilian, attached to various sub-aqua clubs, under the leadership of Fl.Lt. Mike Cameron from the RAF, Northolt, has been investigating and photographing the troubled waters round Frenchman's Rocks at Portnahaven - a singularly un-healthy spot for shipping throughout the ages. One story they were hoping to substantiate was of a French man o' war being intercepted by a British frigate, when, although the French managed to board the frigate, the French vessel sank -hence the name given to the rocks.
According to Neil Smith and Denis Merrall of Claddach, the divers found evidence of wrecks, and in particular five or six cannons, one of which was not identifiable as either French or British. Could it be, after all, that the fathers of the original Rhinns black-haired natives are not pre-Celtic Iberians, but 16th century Spanish sailors ?
Sgt.Ray Pringle Scott, the photographic expert of the team, has taken some spectac-ular underwater shots of the cannons - and of seals - and the RAF and naval experts on historic armoury should come up with some interesting answers soon.



" No,No,I don't see any Dereks, they look chust like a lot of Charlies to me...."

ILEACH

Vol. 2
No. 25
October 20, 1975.

5p

THE NEWSPAPER OF THE ISLAY COUNCIL OF SOCIAL SERVICE

ISLAY OIL? EVANS NO!

Dr Daniel Evans of the Institute of Geological Sciences in Edinburgh has very kindly sent the ILEACH the following report of their findings in their recent drilling operations in Lochindaal and the Sound of Jura.

The MV Whitethorn was working for IGS in the Malin Sea in September, during which time boreholes were drilled off Port Stewart, off MacArthur Head and in Lochindaal.

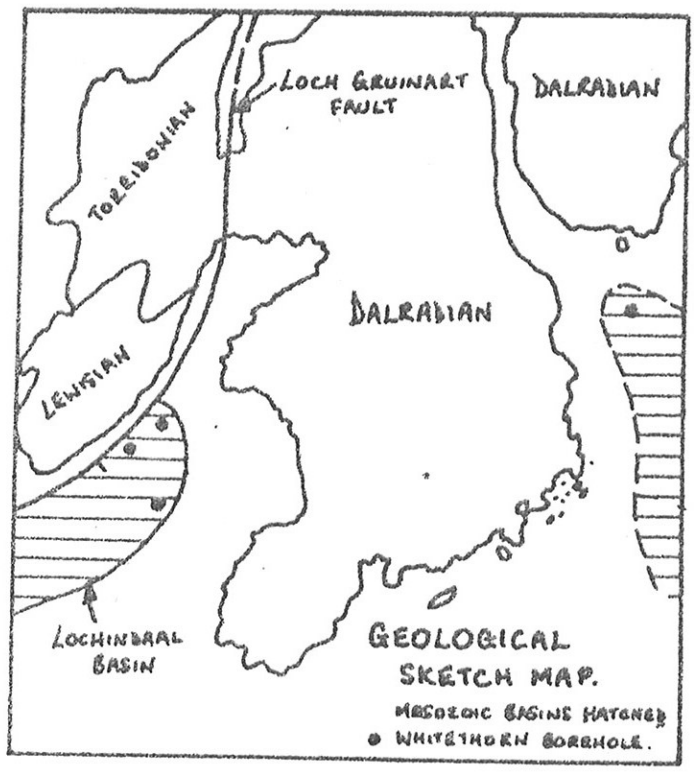
The work in Lochindaal was planned to prove the age of a basin of young rocks which extends into the bay. The basin had previously been located by remote geophysical methods, but the age cannot be established until a sample of the rock has been obtained. The rocks drilled in the three boreholes were of Mesozoic (Triassic and Jurassic) age, that is about two hundred million years old.

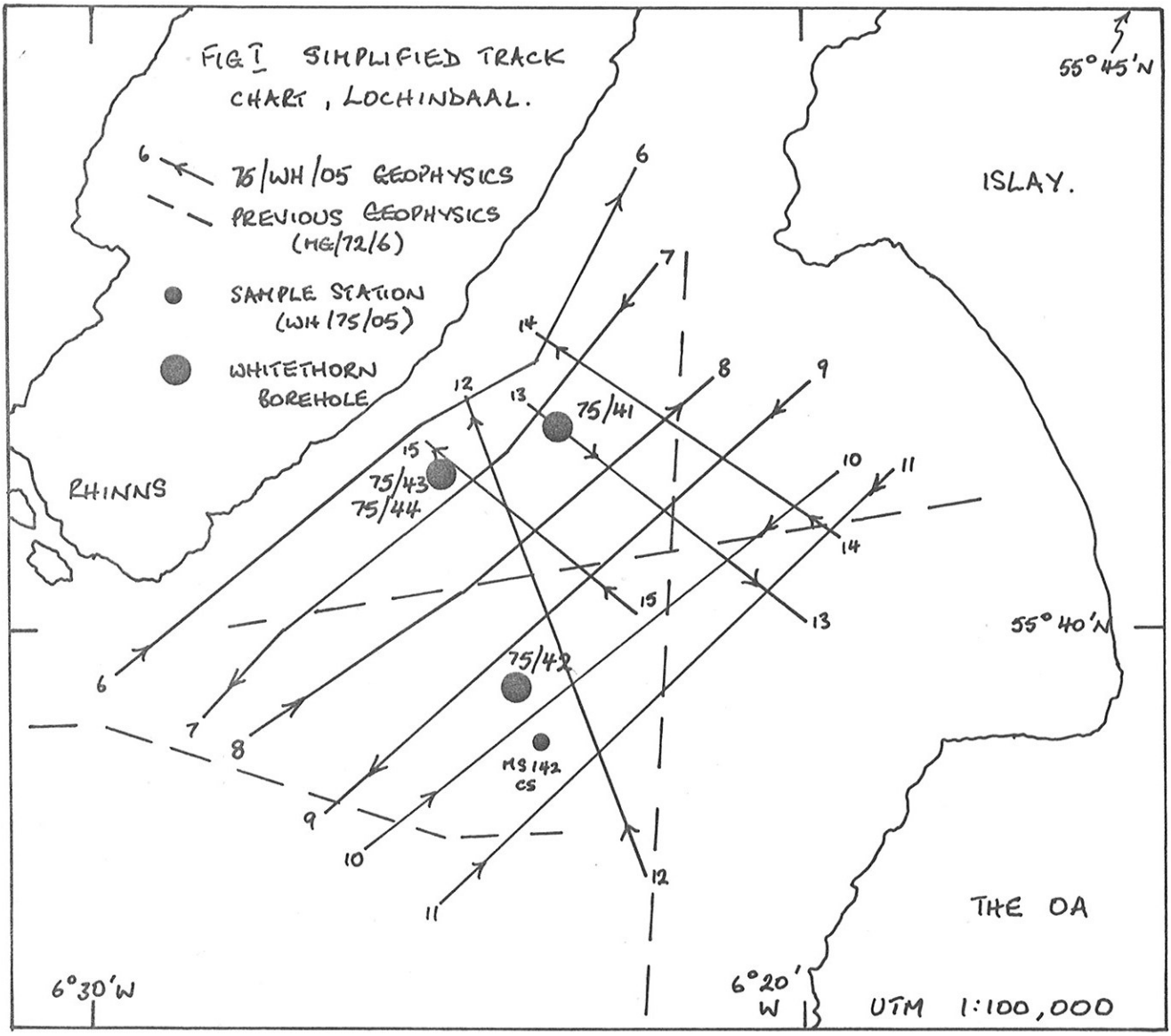
This age may seem rather old but it is in fact relatively young for the so-called Lewisian rocks of the Rhinns are about 1800 million years old, which makes them among the oldes in Europe. Similarly the Dalradian and Torridonian rocks of the remainder of Islay and Jura are over six hundred million years old.

The rocks of the basin, which we call the Lochindaal basin, are separated from the old Lewisian rocks by a major geological fault known as the Loch Gruinart fault. This fault runs within a mile of the shore within the bay and is part of the fault system which forms the Great Glen. Downward movement along this fault in Lochindaal has allowed preservation of the young rocks below sea level, for without the downward movement the young, rather soft rocks would have been washed away.

While the rocks drilled by Whitethorn in Lochindaal are similar to those of nearby land areas such as Northern Ireland, Mull and Skye, they are quite separate and are therefore all the more interesting to geologists.

The rocks drilled off MacArthur Head are also about two hundred million years old and are part of the 'Rathlin trough' basin. In this area the sediments deposited at the end of the Ice Age are also of considerable interest.





WHITEHEAD 4-21 Sept