NATURAL ENVIRONMENT RESEARCH COUNCIL

INSTITUTE FOR MARINE ENVIRONMENTAL RESEARCH

CRUISE REPORT

IMER B/1/81
RVS 1/81

VESSEL RRS JOHN MURRAY

CRUISE PERIOD 26 January - 7 February 1981

PERSONNEL

P H Burkill	HSO	Senior Scientist
R F C Mantoura	PSO	
N J P Owens	HSO	
P G Watson	SSO	
M B Jordan	HSO	
R J M Howland	SO	
A J Pomroy	SO	
E M S-Woodward	SO	

ITINERARY Sketch charts and station lists are attached

Sunday 25 January	Travelled to Barry. Loaded and tested equipment on ship.
Monday 26 "	Locked out 0945 to carry out sea trials off Barry. Faulty turbocharger required replacing; entered locks (1400) to pick up new unit and then anchored off Barry Roads to replace unit. Scientific pumps overboard (1800) and standard suite on-line (1830). Sailed on transect towards Carmarthen Bay at 2330 (Chart 1).
Tuesday 27 "	Completed transect (0600) south of Helwick Sands. Continued to St Gowan for engine trials. Commence CB grid along western approach leg (Chart 2) at 1215. Pass station lat 1440 (Chart 3) and complete grid at St.29 (2334).
Wednesday 28 "	Coring at St.31 (0515-0630). Burry inlet transect begun 0900 and complete 1215 (Chart 4). Current meter layed at Station 30 (1420). Coring at St.31 (1720-1840).
Thursday 29 "	Water pickup from St.25 (0400) and St.29 (0715) for Std.Pri.Pro. experiments and EXPRO. Coring at St.31 (0520-0650). Hand net hauls for MULEX zooplankton at St.9 (0830-0950) and St.4 (1030-1140). Coring at St. 2 (1230-1330).
Friday 30 "	Coring at St.31 (0600-0700). Hand net hauls for MULEX zooplankton at St. 25 (0810-1030). Coring at St.6 (1310-1430). Lewis sampler trials from zodiac (1530-1600). Intermittent loss of A.C. during evening.

Saturday 31 January	Coring at St.31 (0200-0310). Water picked up from St.6 (0440) and St.1 (0630) for Std. Pri. Pro. experiments and EXPRO. Coring at St.25 (0800-0840). Vertical light profiles at St.25, 24, 23, 29, 18, 7, 6, 5 and 4 (1015-1700). Peripheral track in shallow water around CB between 1930-0020 (Chart 5).
Sunday 1 February	Coring at St.31 (0300-0400), and at St.16 (0800-0850). Rhodamine dispersion experiment: Phase I (0915-1155), Phase II (1320-1455, 1635-2130). Coring at St.8 (1520-1540).
Monday 2 "	Coring St.31 (0405-0515). Heavy weather imminent, steamed to Blue Anchor Bay (am). Force 10 forecast, lock in Barry (1930).
Tuesday 3 "	Locked out of Barry (1400). Awaiting arrival of mate off Barry. Sailed for Carmarthen Bay (1800).
Wednesday 4 "	Day grabs at stations 25-29 and 19 (0140-0350). Anchored at St.25 for vertical profiling over tidal cycle (1000-2300) Primary production methodology comparison expt (1200-1800).
Thursday 5 "	Day grabs at St.24 → 1 (0001-1000). Recover current meter (1115-1150) from St.30. RVS request ship to remain in C.B. Later told to sail to Milfordhaven.
Friday 6 "	Two scientists (NJPO and MS.W) disembarked at Milford at 1000. Ship remained on stand-by. Finally allowed to make for Barry at 1630.
Saturday 7 "	Lock in (0730) at Barry. Unload gear from ship and return to Plymouth.

OBJECTIVES

To complete the series of five cruises designed to quantify nutrient cycling processes in Carmarthen Bay including:

1) Nutrient excretion rates of the zooplankton community.
2) Nutrient demand rates by phytoplankton in-situ
3) Nutrient regeneration rates by the benthos
4) Nitrification/denitrification processes by bacteria
5) Nutrient advection and diffusion within and around Carmarthen Bay including the Burry Inlet.

OUTLINE OF PROCEDURES AND METHODS

a) The following state variables were measured along the 29 station grid in Carmarthen Bay. Temperature, turbidity, salinity, fluorescence, microseston, POC, PON, Chlorophyll-a, phaeopigments, nitrate, nitrite, silicate, phosphate, ammonia, primary amines, urea, DOC, DON, DOP. Double-oblique hauls with the 30" Lowestoft sampler equipped with 100 μm and 280 μm nets were carried out at alternate stations, and counts of nitrifying and ammonifying bacteria every third station. Incident photosynthetically-active radiation (PAR) was measured continuously; vertical profiles of PAR, particulates and nutrients were carried out.

b) Shipboard experimental rate measurements of plankton, benthos and water samples from CB included:

i) Multiple excretion experiments (MULEX) carried out on four size classes of zooplankton to measure respiration and excretion rates of NH_3, $R.NH_2$, PO_4, SiO_4 and DOC.

ii) Primary production and nutrient demand rates were measured by standard and experimental production (EXPRO) techniques using $^{14}C\text{-}CO_3$, $^{15}H\text{-}NH_3$ and $^{15}N\text{-}NO_3$.

iii) Bacterial nutrient remineralization rates were determined using ^{15}N isotope dilution techniques.

iv) Benthic nutrient regeneration rates were determined using onboard isothermal incubation of cores and measurement of release rates of NH_3, NO_3 and O_2.

c) Measurement of a core-suite of biological, chemical and physical variables were made on a transect up the Burry Inlet to provide low salinity input data to Carmarthen Bay.

d) Vertical and horizontal dispersion measurements were made using rhodamine dye adjacent to the current meter mooring (St.30).

e) Day grab samples obtained at all stations in Carmarthen Bay will be used from granulometry and sediment analysis.

EQUIPMENT PERFORMANCE AND OVERALL CRUISE SUCCESS

Although over 12 hours were lost due to ship turbocharger problems, this still allowed us to start our work in the Bay as scheduled. The excellent weather during the first week and good co-operation from the master and ships crew allowed all major objectives* to be met during this time. The second week with intermittent westerly gale (force 8) to storm (force 10) weather allowed some science-of-opportunity to be carried out as described above.

* including the Burry Transect and the dye dispersion experiment.

All scientific equipment worked well, although for the first two days only 3 out of 4 autoanalyser channels were available. Apart from the turbocharger, there was intermittent loss of A.C. on the evening of 30/1 causing the loss of several samples in auto-analysis equipment. A MULEX hand net and depressor system were lost when the ship was going astern after the officer on watch had informed the scientist it was safe to deploy gear over the stern.

Scientifically the cruise was 100% success.

Prepared by: P H Burkill
Approved by: B.C. Boyce
Date: 26-2-81

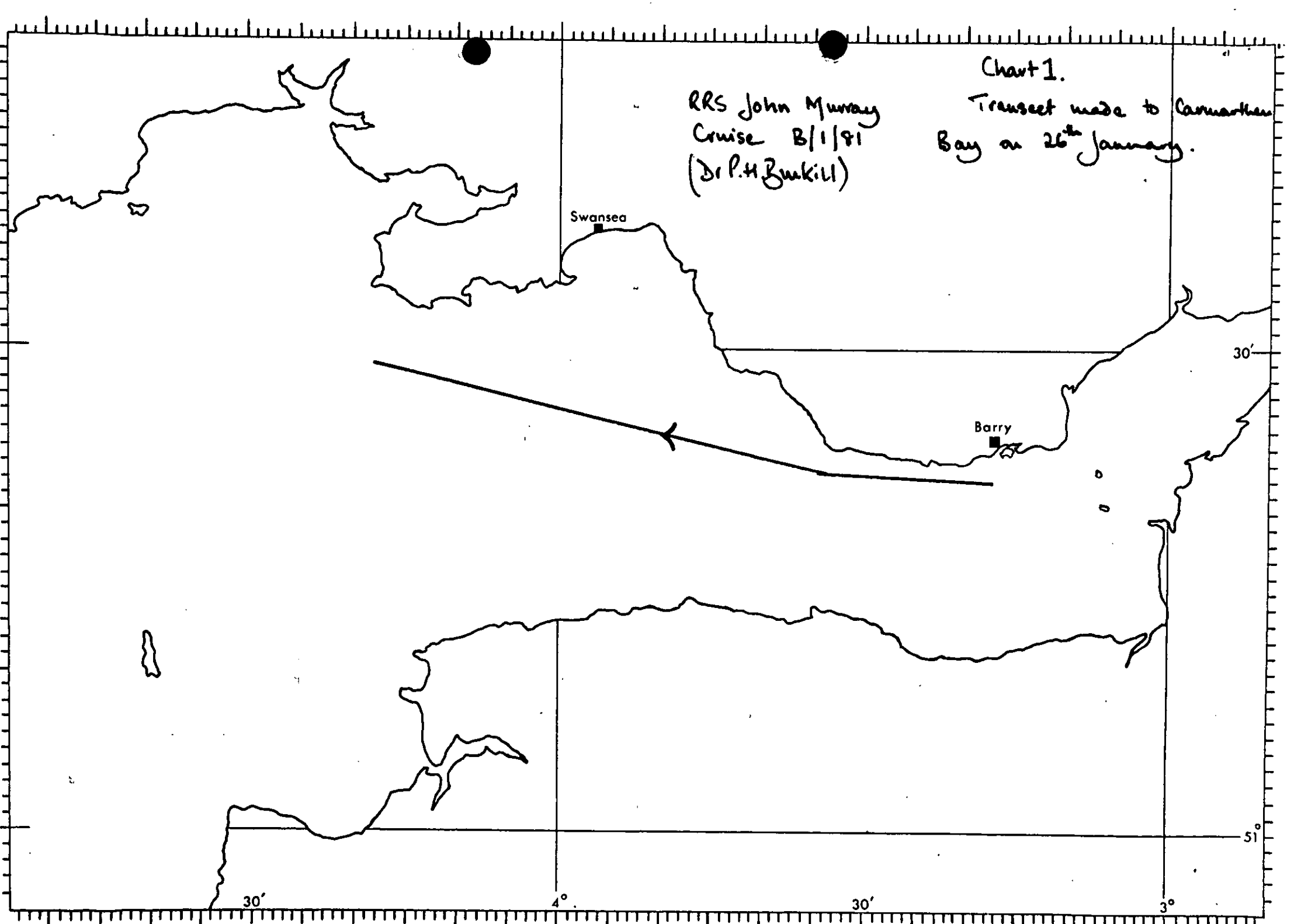
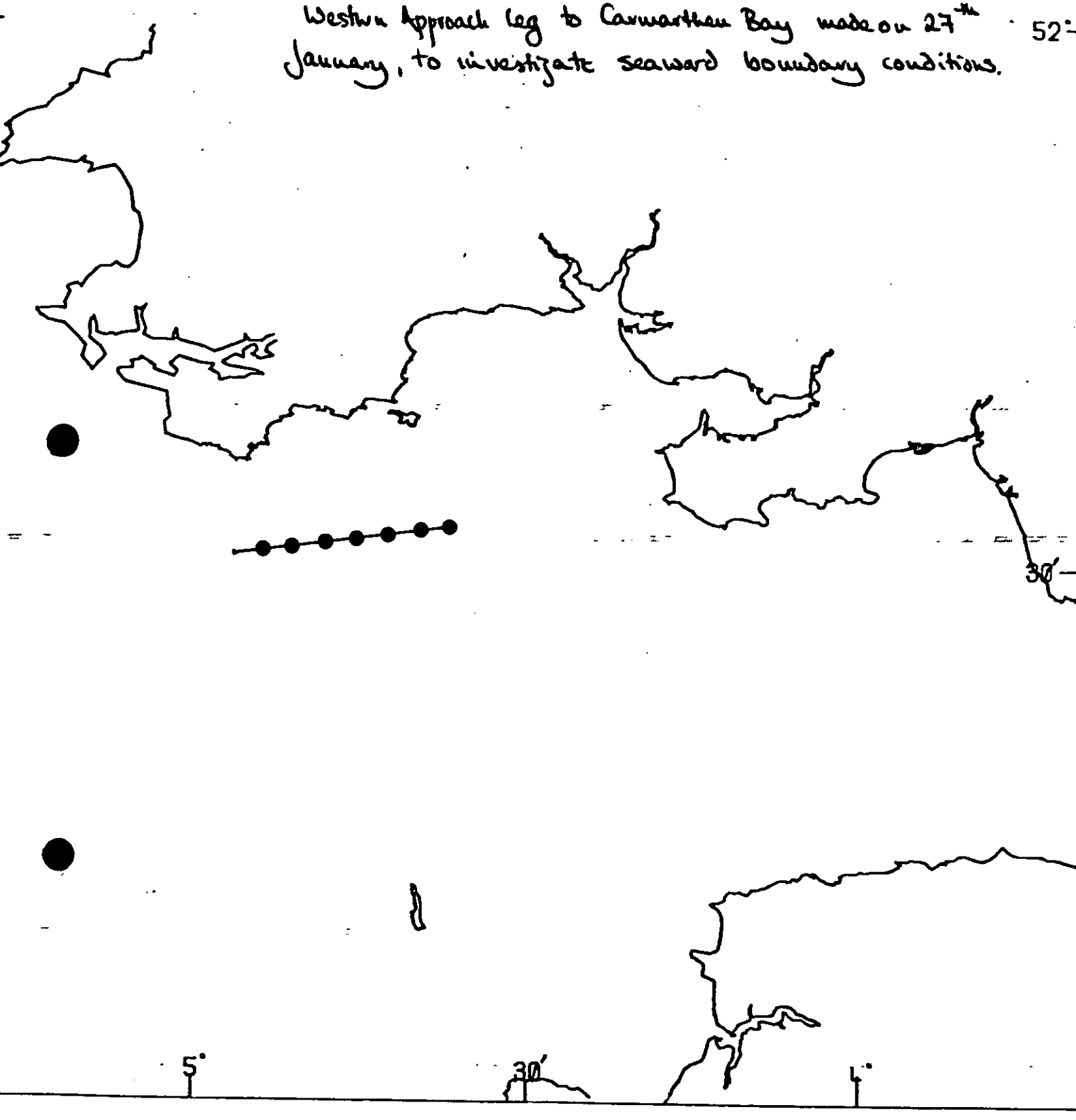
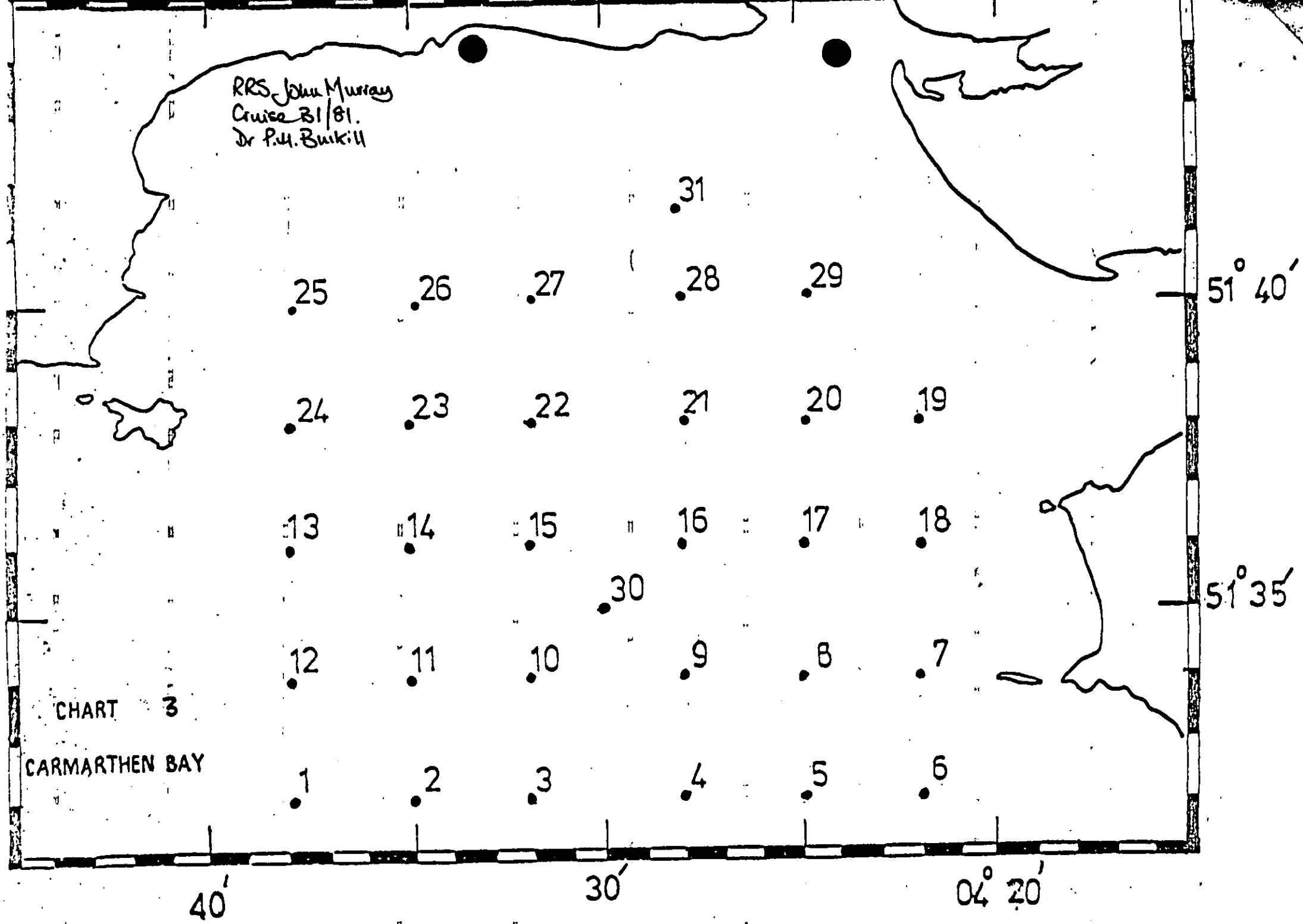


Chart 1.
RRS John Murray
Cruise B/1/81
(Dr P.H Burkill)
Transect made to Carmarthen
Bay on 26th January.
Swansea
Barry
30'
51°
30'
4°
30'
3°

Chart 2. R.R.S. John Murray. 3.1.81. (Dr P.H. Burkill).

Western Approach leg to Carmarthen Bay made on 27th January, to investigate seaward boundary conditions.




RRS John Murray
Cruise 31/81.
Dr P.M. Burkill
31
25
26
27
28
29
51° 40′
24
23
22
21
20
19
13
14
15
16
17
18
30
51° 35′
12
11
10
9
8
7
CHART 3
CARMARTHEN BAY
1
2
3
4
5
6
40′
30′
04° 20′

Transect showing station positions, made up the Burry Inlet on 28 January, to investigate low salinity inputs to Carmarthen Bay.

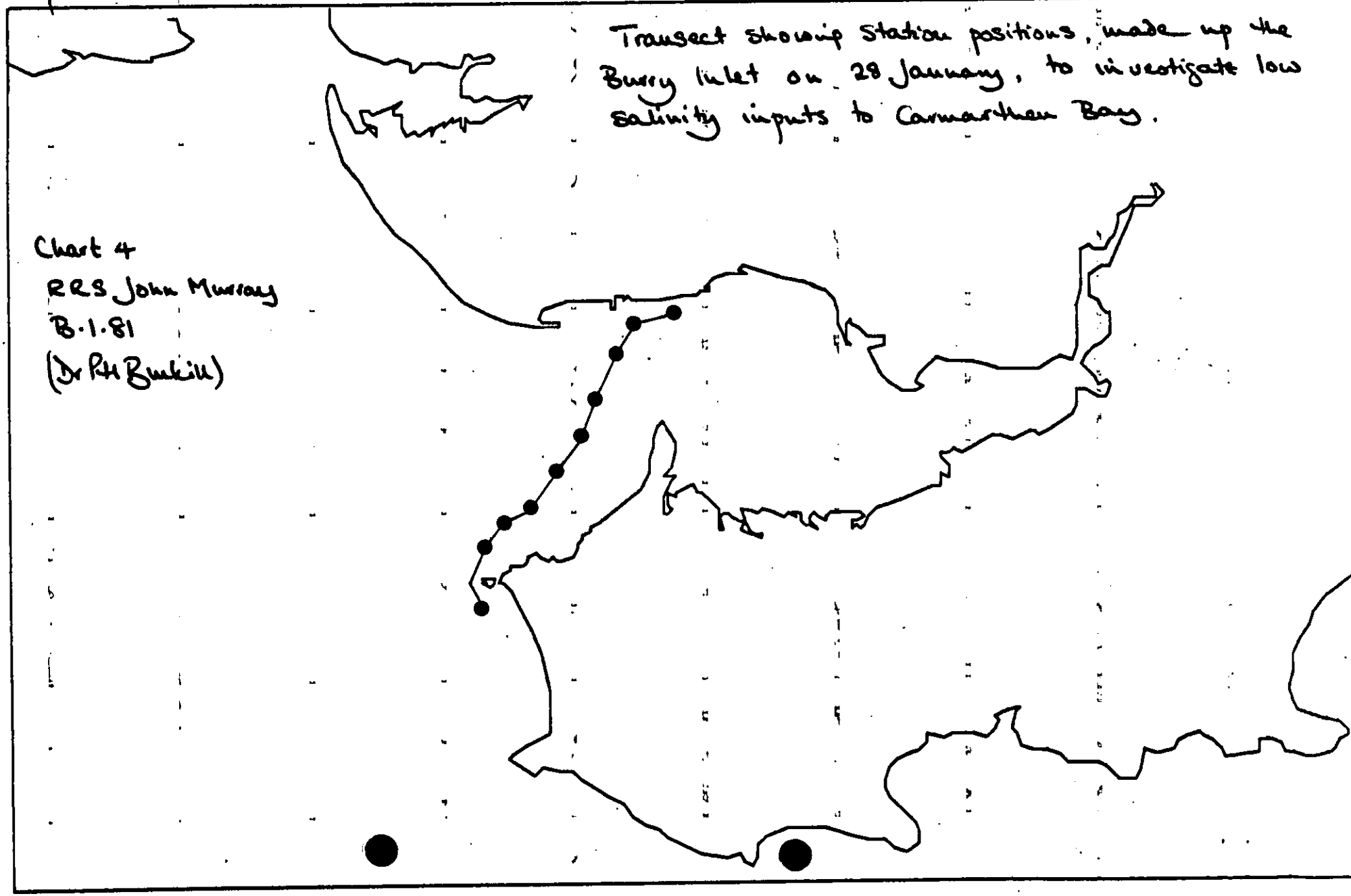
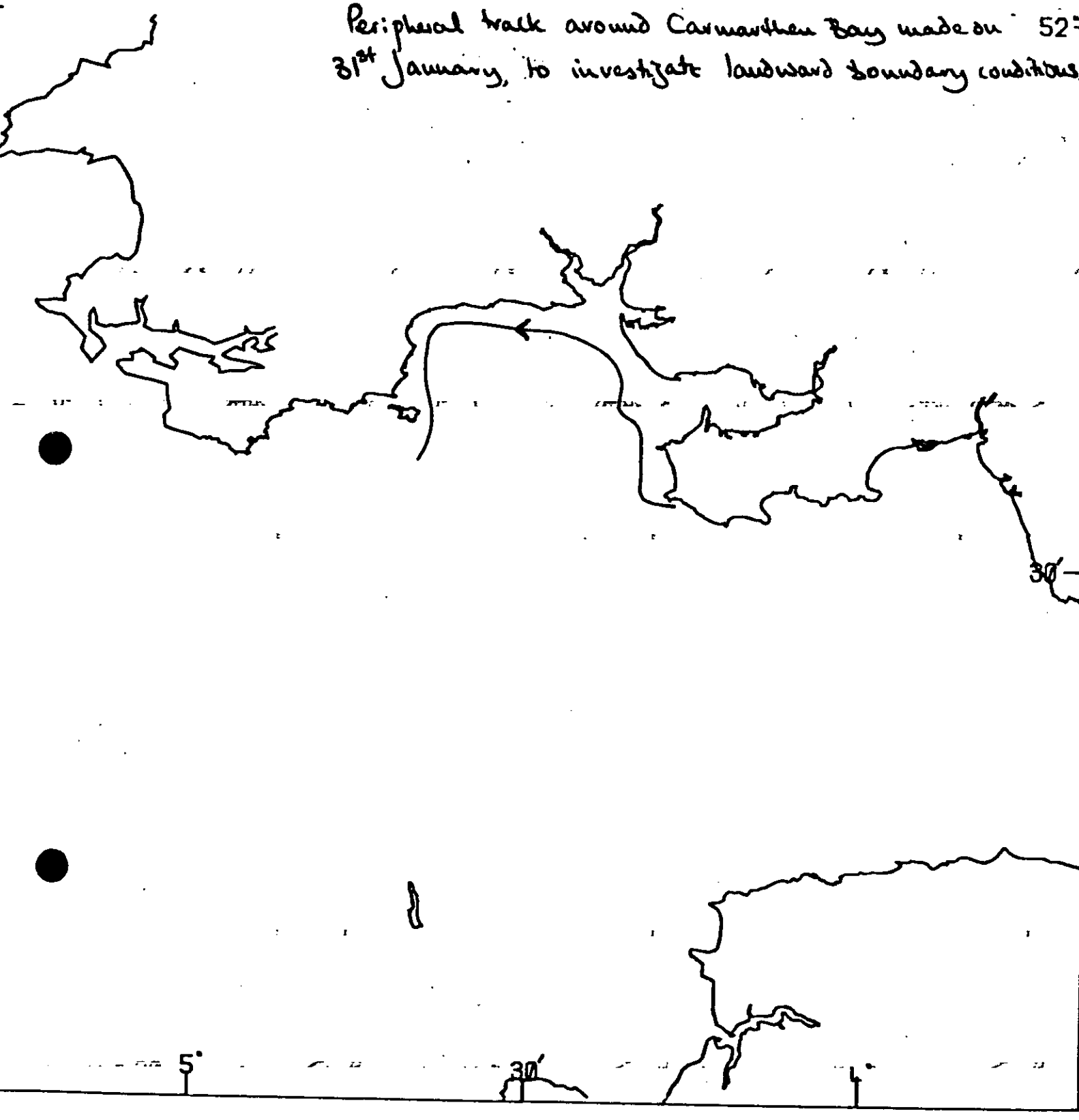


Chart 4
RRS John Murray
B·1·81
(Dr Pat Burkill)

Chart 5. RRS John Murray. 3.1.81 (Dr P.H. Burkill)

Peripheral track around Carmarthen Bay made on 52
31st January, to investigate landward boundary conditions



CARMARTHEN BAY GRID POSITIONS (MULEX)

STATION	LATITUDE °N	LONGITUDE °W
1	51°32.0'	04°38.0'
2	51°32.0'	04°34.8'
3	51°32.0'	04°31.6'
4	51°32.0'	04°28.4'
5	51°32.0'	04°25.2'
6	51°32.0'	04°22.0'
7	51°34.0'	04°22.0'
8	51°34.0'	04°25.2'
9	51°34.0'	04°28.4'
10	51°34.0'	04°31.6'
11	51°34.0'	04°34.8'
12	51°34.0'	04°38.0'
13	51°36.0'	04°38.0'
14	51°36.0'	04°34.8'
15	51°36.0'	04°31.6'
16	51°36.0'	04°28.4'
17	51°36.0'	04°25.2'
18	51°36.0'	04°22.0'
19	51°38.0'	04°22.0'
20	51°38.0'	04°25.2'
21	51°38.0'	04°28.4'
22	51°38.0'	04°31.6'
23	51°38.0'	04°34.8'
24	51°38.0'	04°38.0'
25	51°40.0'	04°38.0'
26	51°40.0'	04°34.8'
27	51°40.0'	04°31.6'
28	51°40.0'	04°28.4'
29	51°40.0'	04°25.2'
30	51°35.0'	04°30.0'
31	51°41.0'	04°28.0'
32	51°31.8'	04°41.2'
33	51°31.6'	04°44.4
34	51°31.4'	04°47.6'
35	51°31.2'	04°50.8'
36	51°31.0'	04°54.0'
37	51°30.8'	04°57.2'