MINISTRY OF AGRICULTURE, FISHERIES AND FOOD
FISHERIES LABORATORY, LOWESTOFT, SUFFOLK, ENGLAND

1992 RESEARCH VESSEL PROGRAMME

REPORT: RV CIROLANA 2c/92

(Provisional not to be quoted without prior reference to the author)

STAFF: P J Kershaw (SIC, 1-5 February)
J M Rees (SIC, 5-10 February)
A Poole
D J Allington
D C Denoon
H Emerson

N D Pearson (1-6 February)
M O Green (Univ. Cambridge, 1-6 February)
J F Knowles (6-10 February)
S Di (Univ. Beijing, 6-10 February)
C Stone (JNCC, 6-10 February)

DURATION: (Overall Cruise 2 17 January-10 February) (All times GMT)

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|---|---|---|
| Sailed Workington | 0915 | 1 February 1992 |
| Docked Lowestoft | 1300 | 10 February 1992 |

AIMS:

5. To collect sediment and water samples from the vicinity of the Marchon phosphogypsum plant for the determination of natural-series radionuclides, using the ship's 'Searider' if conditions permit (ACB4).

6. Conduct two 25 h tetrapod stations, with additional sampling for $^{234}Th/^{238}U$, in Liverpool Bay and off the Cumbrian coast (ACB6, COSEDS).

7. Lay three current meters and the tetrapod for a long-term deployment off the Cumbrian coast (ACB6, COSEDS).

8. Fish for dab in Liverpool Bay (contaminated site) and Cardigan Bay (control site). Blood samples will be taken for cytological and immunological purposes and live fish returned to Lowestoft for further study (AE).

9. Make observations on seabird distributions on the return leg (JNCC).

NARRATIVE:

CIROLANA left Workington at 0915 and anchored off the Marchon plant. Searider operations commenced collecting water and sediment samples from a grid of 25 sites around the outfall from the Albright - Wilson Marchon site. During the afternoon

weather conditions worsened stopping small boat operations. Part of the offshore section of the grid was completed on the 2nd.

Overnight on the 2/3th the CIROLANA sailed south to Liverpool Bay for an anchor station at the dumped spoil ground at Site Z. However, weather conditions did not allow the tetrapod to be deployed and the anchor station was abandoned. Overnight 3/4th CIROLANA sailed north to the Whitehaven area to complete the offshore grid of water and sediment samples around the Marchon pipe for Aim 5. The new Acoustic Backscatter Logger was tested on a CTD dip. The tetrapod and 3 guard buoys were deployed in the afternoon on the mud patch off Sellafield.

On the 5 February Dr Kershaw was put ashore via the ship's searider. Further water and sediment samples were taken and two current meter moorings were deployed inshore and offshore from the tetrapod. Craib cores were taken from the tetrapod site for radionuclide analysis for $^{234}Th/^{238}U$.

Several water/sediment stations were undertaken on 6 February before an exchange of scientists via the ship's searider. During the afternoon small boat operations continued, until weather conditions worsened, collecting water and sediment samples from the inshore sites around the outfall. Further water stations were sampled from the CIROLANA as close as possible to the shore.

By the morning of the 7 February the CIROLANA had reached Liverpool Bay and several Day Grabs were taken to line the base of the 'contaminated' holding tank. Two Granton trawls were completed but due to damage caused by large boulders and a ripped wing, a beam trawl was tried. This again filled with boulders and so another site further west was chosen to trawl. Two further Granton tows produced sufficient dabs.

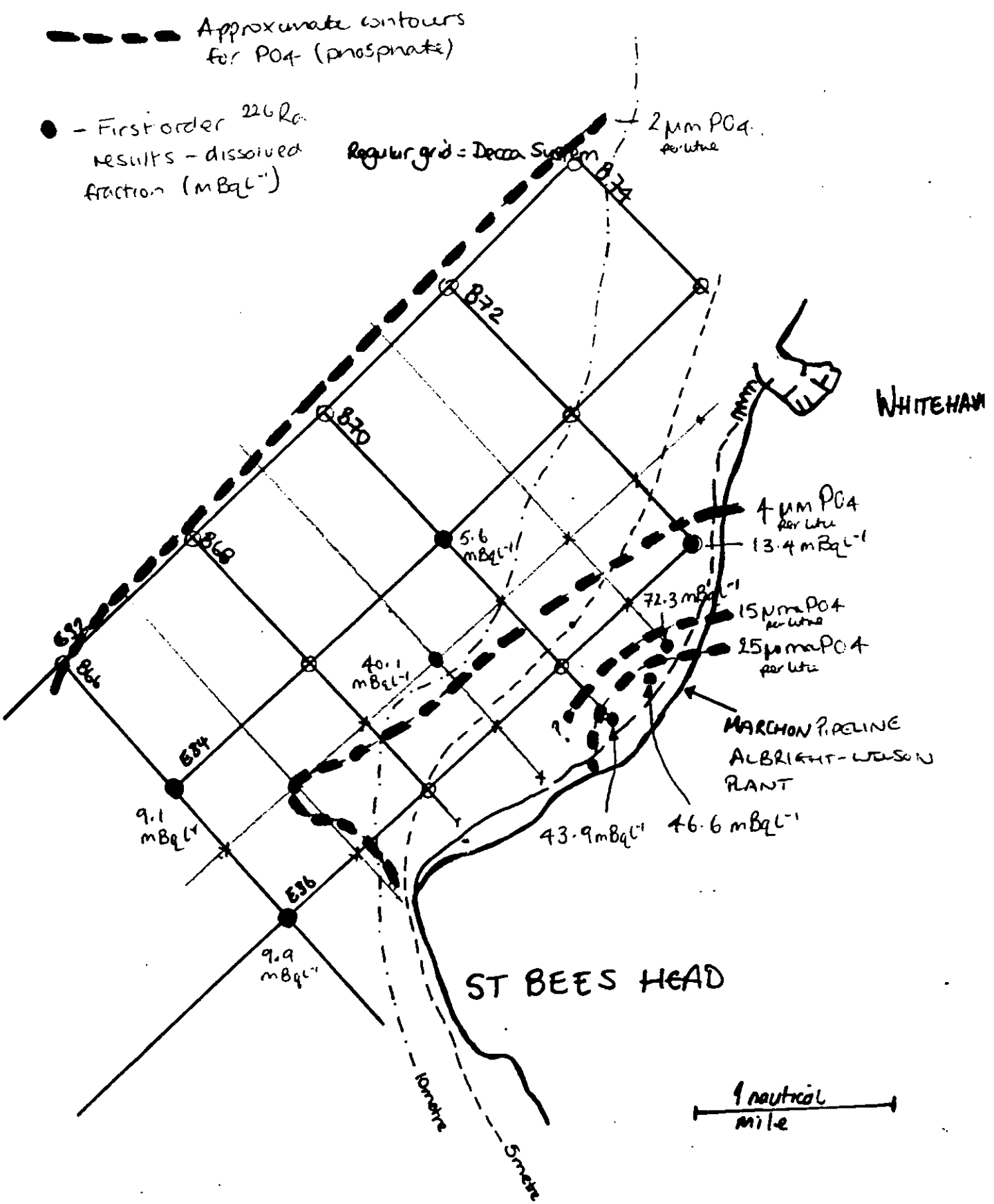
Overnight 7/8th the CIROLANA sailed for Cardigan Bay where further Granton trawls were undertaken for 'control' dabs.

The CIROLANA then returned to Lowestoft collecting a large water sample off Lands End on the morning of the 9th and docking at 1300 h on the 10th February.

RESULTS:

Aim 5. A total of 38 sites were visited, of which 14 stations were sampled for $^{228}Th$, $^{230}Th$, $^{234}Th$, $^{234}U$, $^{238}U$, $^{210}Pb$, $^{210}Po$ and $^{226}Ra$. Of the 38 sites, 1 was visited three times, 13 twice and the remainder once to study temporal variations. At all stations 5 litre samples were taken for salinity, suspended load, phosphate and silicates analysis. Preliminary results (see attached figure) from the phosphate determinations indicate a semi-circular concentration pattern of phosphate focused on the pipeline with concentrations decreasing offshore. The highest concentration was 29 $\mu m\ l^{-1}$ seen to the south of the outfall. Unfortunately the content of the pipe and the foam could not be collected. The 1st order $^{226}Ra$ results (see figure) indicate concentrations up to 72.3 $mBq\ l^{-1}$ with these once again falling away from the outfall.

Aim 6. No anchor stations were completed due to bad weather. These sites may be visited on CORYSTES 3b/92.


Approximate contours for PO4 (phosphate)
● - First order 226Ra results - dissolved fraction (mBqL⁻¹)
Regular grid = Decca System
2 µm PO4 per litre
874
872
870
868
866
864
862
E84
E86
WHITEHAVEN
4 µm PO4 per litre
13.4 mBqL⁻¹
5.6 mBqL⁻¹
72.3 mBqL⁻¹
15 µm PO4 per litre
25 µm PO4 per litre
40.1 mBqL⁻¹
MARCHON PIPELINE
ALBRIGHT-WILSON PLANT
9.1 mBqL⁻¹
43.9 mBqL⁻¹
46.6 mBqL⁻¹
9.9 mBqL⁻¹
ST BEES HEAD
10 metre
5 metre
1 nautical mile

Aim 8. 4 Granton trawls and a beam trawl were undertaken in Liverpool Bay for dabs. Approximately 50 dabs were caught for return to Lowestoft for immunological examination and 20 processed to provide slides for cytological examination (chromosome abnormalities) or to provide serum and histological samples for immunological analysis. 4 Granton trawls in Cardigan Bay produced approximately 59 dabs for return and on board analysis.

Aim 9. Seabird observations were made on the return leg to Lowestoft.

Additional Aim 10. Several herring were collect from Liverpool Bay for testing for the Ichthyophonus Disease.

J M Rees
(Scientist in Charge 5-10 February)
1 April 1992

SEEN IN DRAFT: BC, JH

INITIALLED: ISR

DISTRIBUTION:

Basic List+
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N Pearson
J Knowles
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A Young
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