NATURAL ENVIRONMENTAL RESEARCH COUNCIL

Application for Consent to conduct
Marine Scientific Research
ICELAND

Date: 24th November 2014

1. General Information

1.1 Cruise name and/or number: **DY031**

1.2 Sponsoring Institution(s):	
Name:	National Oceanography Centre
Address:	European Way, Southampton, SO14 3ZH
Name of Director:	Prof. Ed. Hill

1.3 Scientist in charge of the Project:	
Name:	Dr N. Penny Holliday
Country:	UK
Affiliation:	National Oceanography Centre
Address:	European Way, Southampton, SO14 3ZH
Telephone:	023 8059 6206
Fax:	
Email:	penny.holliday@noc.ac.uk
Website (for CV and photo):	noc.ac.uk/people/nph

1.4 Entity(ies)/Participant(s) from coastal State involved in the planning of the project:	
Name:	
Affiliation:	
Address:	
Telephone:	
Fax:	
Email:	
Website (for CV and photo):	

2. Description of Project

2.1 Nature and objectives of the project:
The cruise will be making the 2015 annual occupation of the Extended Ellett Line. The Extended Ellett Line is a hydrographic section between Iceland and Scotland that is occupied annually by scientists from the National Oceanography Centre (NOC) and the Scottish Association for Marine Science (SAMS), UK. The measurement programme began as a seasonally-occupied hydrographic section in the Rockall Trough in 1975, building on early surface observations made underway from ocean weather ships. In 1996 the section was extended to Iceland, sampling three basins: the Rockall Trough, the Hatton-Rockall Basin and the Iceland Basin. These three basins form the main routes though which warm saline Atlantic water flows northwards into the Nordic Seas and Arctic Ocean. The section crosses the eastern North Atlantic subpolar gyre; as well as the net northward flow there is a large recirculation of the upper layers as part of the wind-driven gyre. During its passage through the region, the warm saline water is subjected to significant modification by exchange of heat and freshwater with the atmosphere. The two deep basins (Rockall Trough and Iceland Basin) contain southward flowing dense northern overflow waters, and Labrador Sea Water in the intermediate layers.

The specific objectives of the 2015 Extended Ellett Line cruise are:

- To complete the annual Extended Ellett Line CTD section
- To collect water samples for measuring biogeochemical properties including dissolved oxygen, nutrients, carbon and trace metals.
- To collect underway measurements of surface currents, surface temperature and salinity, bathymetry, surface meteorology.
- To complete epibenthic sled tows at a deep location in the central Rockall Trough.
- To launch a seaglider for a related research programme (near Rockall) which will stay in UK or international waters.
- To launch a second seaglider for a related research programme (near Iceland) which will operate in Iceland and Greenland waters.
- To recover a partially-destroyed mooring (for the FASTNeT programme)
- To deploy 3 Met Office Argo floats along the CTD section

2.2 If designated as part of a larger scale project, then provide the name of the project and the Organisation responsible for coordinating the project:

The Extended Ellett Line programme is jointly led by N. Penny Holliday at NOC and Stefan Gary at SAMS. projects.noc.ac.uk/ExtendedEllettLine/

The programme is also part of the UK NERC National Capability sustained measurement programme, coordinated by Ian Wright, National Oceanography Centre.

2.3 Relevant previous or future research projects:

The programme is part of a long-term strategic project to understand the physical forcing and response of the ocean west of the UK. The Extended Ellett Line programme began in 1975 and we anticipate that it will continue in the form of annual CTD sections (spring/summer) and at least annual glider sections in the winter.

Recent cruises that completed the section are:

JR302 RRS James Clark Ross, 6 June - 22 July 2014. Cruise report at www.bodc.ac.uk/data/information_and_inventories/cruise_inventory/report/15037/

JC086 RRS James Cook, 6 - 26 May 2013. Cruise report at www.bodc.ac.uk/data/information_and_inventories/cruise_inventory/report/13389/

D379 RRS Discovery, 30 Jul - 17 Aug 2012. Cruise report at www.bodc.ac.uk/data/information_and_inventories/cruise_inventory/report/11412/

D365, RRS Discovery, 11 May - 2 Jun 2011. Cruise report at www.bodc.ac.uk/data/information_and_inventories/cruise_inventory/report/10574/

2.4 Previous publications relating to the project:

Recent publications include the following.

Johnson, C., Inall, M., Hakkinen, S., 2013. Declining nutrient concentrations in the northeast Atlantic as a result of a weakening Subpolar gyre, Deep Sea Research I, 82, 95-107, http://dx.doi.org/10.1016/j.dsr.2013.08.007

Beszczynska-Moller, A. and Dye, S.R. (Eds), 2013. ICES Report on Ocean Climate 2012. ICES Cooperative Research Report No 321, 73pp

Dye, S, Hughes, S.L., Tinker, J., Berry, D., Holliday, N.P., Kent, E.C., Kennington, K., Inall, M., Smyth, T., Nolan, G., Lyons, K., Andres, O., Beszczynska-Moller, A., 2013a, Impacts of climate change on temperature (air and sea), Marine Climate Change Impacts Partnership: science review, MCCIP Science Review 2013: 1-xxx, published online Nov 13.

Dye, S, Holliday, N.P., Hughes, S.L., Inall, M., Kennington, K., Smyth, T., Tinker, J., Andres, O., Beszczynska-Moller, A., 2013b, Impacts of climate change on salinity, Climate Change Impacts Partnership: science review, MCCIP Science Review 2013: 1-xxx, published online Nov 13.

MCCCIP, 2013. Marine Climate Change Impacts Report Card 2013, (Eds, Frost, M, Baxter, J.M., Bayliss-Brown, G.A., Buckley, P.J., Cox, M., Withers Harvey, N.), Summary Report, MCCIP, Lowestoft, 12pp.

Holliday, N.P. and Cunningham, S., 2013. The Extended Ellett Line: Discoveries From 65 Years of Marine Observations West of the UK. Oceanography Oceanography 26(2):156–163, http://dx.doi.org/10.5670/oceanog.2013.17

Holliday, N.P., Cunningham, S., Griffiths, C., 2013. State of the eastern North Atlantic subpolar gyre: the Extended Ellett Line Programme, Annual Report No. 1. National Oceanography Centre Research and Consultancy Report No 36, 15pp.

Holt, J., Hughes, S., Hopkins, J., Wakelin, S.L., Holliday, N.P., Dye, S., Gonzalez-Pola, C., Saetre Hjollo, S., Mork, K-A., Nolan, G., Proctor, R., Read, J., Shammon, T., Sherwin, T., Smyth, T., Tattersall, G., Ward, B., Wiltshire, K., 2012. Multi-decadal variability and trends in the temperature of the northwest European continental shelf: a model-data synthesis, Progress in Oceanography, 106, 96-117

Hughes, S., Holliday, N.P., Gaillard, F. and ICES Working Group on Oceanic Hydrography. 2012. Variability in the ICES/NAFO region between 1950 and 2009: observations from the ICES Report on Ocean Climate. ICES Journal of Marine Science, 69, (5), 706-719. doi:10.1093/icesjms/fss044

Sherwin, T.J., Read, J.F., Holliday, N.P., Johnson, C., 2012. The impact of changes in the North Atlantic Gyre distribution on water mass characteristics in the Rockall Trough. ICES Journal of Marine Science; doi:10.1093/icesjms/fsr185.

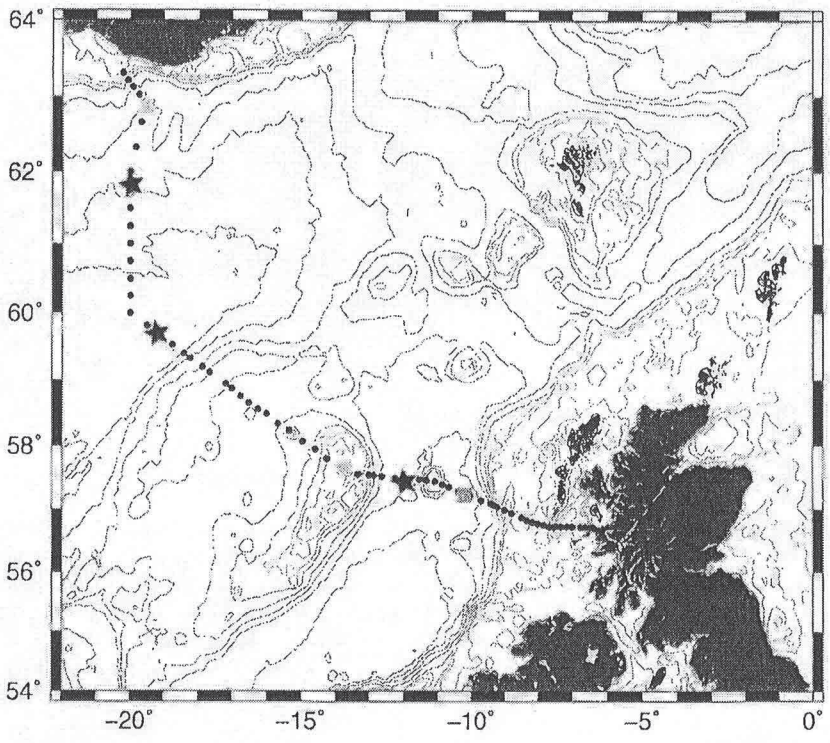
Johnson, C., 2012. Tracing Wyville Thomson Ridge Overflow Water in the Rockall Trough, PhD Thesis, University of Aberdeen.

Dye, S.R., Nolan, G. D. and Beszczynska-Moller, A. (Eds), 2012, ICES Report on Ocean Climate 2011, ICES Cooperative Research Report No. 314, 77 pp.

3. Geographical Areas

3.1 Indicate geographical areas in which the project is to be conducted (with reference in latitude and longitude, including coordinates of cruise/track/way points)
The general area is north-eastern North Atlantic approximately between 5-22°W, 54-64°N. The section waypoints are as follows: start at 63.3°N 20.2°W (close to Iceland coast) line to 62.7°N 19.7°W line to 60.0°N 20.0°W line to 57.6°N 13.6·W (close to Rockall) line to 57.5°N 11.0°W (Anton Dohrn seamount) line to, and end at 56.7·N 6.1°W (close to Scotland coast) The first AUV (Seaglider) will be deployed at the Rockall station position on the section (57.6°N 13.6°W) and will stay in international or UK waters. The second AUV (Seaglider) will be deployed near the 1500 m isobath at approximately (62.9 °N, 19.5 °W) and will traverse Iceland and Greenland waters. The epibenthic sled tows will be at Station M (57.3°N 10.4°W). The mooring to be recovered is at 55.45·N, 10.0°W. The mooring has been damaged by fishing and most of the mooring has already been recovered. The equipment to be recovered now consists only of the acoustic release and some buoyancy. Subsurface floats will be deployed at 3 deep ocean locations along the CTD line.

3.2 Attach chart(s) at an appropriate scale (1 page, high-resolution) showing the geographical areas of the intended work and, as far as practicable, the location and depth of sampling Stations, the tracks of survey lines, and the locations of installations and equipment.



Red dots are CTD station positions, black stars are float deployment locations, blue square is location of mooring to be recovered, green square is location of epibenthic tows, yellow squares are locations of glider deployment.

4. Methods and means to be used

4.1 Particulars of vessel:	
Name:	Discovery
Type/Class:	Lloyds Register Lloyd's +100A1 Oceanographic Research Vessel, IWS, Ice Class 1D +LMC, UMS, DP(AM), Green Passport, Shipwright (SERS)
Nationality (Flag State):	British
Identification Number (IMO/Lloyds No.):	9588029
Owner:	Natural Environmental Research Council
Operator:	National Marine Facilities Sea Systems
Overall length (meters):	99.70 Metres
Maximum draft:	6.60 Metres
Displacement/Gross Tonnage:	Net Tonnage: 1785 Gross Tonnage: 5952
Propulsion:	Diesel Electric
Cruising & maximum speed:	12 Knots & 15 Knots Max Speed
Call sign:	2FGX5
INMARSAT number and method and capability of communication (including emergency frequencies):	00870773238856 (Voice) 00870783255483 (Fax) 0580 42359533 (Sat C)
Name of Master:	TBA
Number of Crew:	24
Number of Scientists on board:	28

4.2 Particulars of Aircraft:	
Name:	
Make/Model:	
Nationality (flag State):	
Website for diagram & Specifications:	
Owner:	
Operator:	
Overall Length (meters):	
Propulsion:	
Cruising & Maximum speed:	
Registration No.:	
Call Sign:	
Method and capability of communication (including emergency frequencies):	
Name of Pilot:	
Number of crew:	
Number of scientists on board:	
Details of sensor packages:	
Other relevant information:	

4.3 Particulars of Autonomous Underwater Vehicle (AUV):	
Name:	Seaglider
Manufacturer and make/model:	Kongsberg Underwater Technology Incorporated, model: Seaglider 1KA
Nationality (Flag State):	British
Website for diagram & Specifications:	http://www.apl.washington.edu/projects/seaglider/specifications.html
Owner:	National Environmental Research Council
Operator:	Scottish Association for Marine Sciences (SAMS)
Overall length (meters):	2.8 m
Displacement/Gross tonnage:	52 kg (dry)

Cruising & Maximum speed:	Cruising: 0.25 cm/s, maximum: 0.30 m/s
Range/Endurance:	3,000 km / 6 months
Method and capability of communication (including emergency frequencies):	Iridium satellite network
Details of sensor packages:	Digiquartz pressure sensor Seabird conductivity and temperature sensors Aanderaa oxygen optode Wetlabs fluorescence and backscatter sensor Possibly ADCP
Other relevant information:	Instrument to be recovered in August or September 2014 by a different ship in Greenland waters. Once deployed, the glider will be subject to a separate application to be submitted by SAMS.

4.4 Other craft in the project, including its use:

4.5 Particulars of methods and scientific instruments:		
Types of samples and measurements:	Methods to be used:	Instruments to be used:
Water properties including temperature, salinity, velocity, oxygen, nutrients and carbon	CTD profiling package	SeaBird CTD and water rosette system, RDI LADCP system
Underway sampling	Acoustic, Atmospheric and sea surface water sampling	ADCPs, echo sounders, thermosalinograph
Benthic ecology	Tow	Epibenthic sled

4.6 Indicate nature and quantity of substances to be released into the marine environment:
None. Small quantities of laboratory agents will be used within the laboratories aboard the ship. All waste products will be disposed of on return to the UK.

4.7 Indicate whether drilling will be carried out. If yes, please specify:
No

4.8 Indicate whether explosives will be used. If yes, please specify type and trade name, chemical content, depth of trade class and stowage, size, depth of detonation, frequency of detonation, and position in latitude and longitude:
No

5. Installations and Equipment

5.1 Details of installations and equipment (including dates of laying, servicing, method and anticipated timeframe for recover, as far as possible exact locations and depth, and measurements):
None

6. Dates

6.1 Expected dates of first entry into and final departure from the research area by the research vessel and/or other platforms:
31 May to 16 June 2015
6.2 Indicate if multiple entries are expected:
No

7. Port Calls

7.1 Dates and Names of intended ports of call:
25-28 May 2015 Southampton 18-20 June 2015 Liverpool No port calls planned in Iceland

7.2 Any special logistical requirements at ports of call:
N/A

7.3 Name/Address/Telephone of shipping agent (if available):
N/A

8. Participation of the representative of the coastal State

8.1 Modalities of the participation of the representative of the coastal State in the research project:

8.2 Proposed dates and ports for embarkation/disembarkation:
Embarkation: 27 May 2015 Southampton Disembarkation: 18 June 2015 Liverpool

9. Access to Data, Samples and Research Results

9.1 Expected dates of submission to coastal State of preliminary report, which should include the expected dates of submission of the data and research results:
One month after the end of the cruise.

9.2 Anticipated dates of submission to the coastal State of the final report:
Six months after the end of the cruise.

9.3 Proposed means for access by coastal State to data (including format) and samples:
Data will be available through the British Oceanographic Data Centre (www.bodc.ac.uk)

9.4 Proposed means to provide coastal State with assessment of data, samples and research results:
Final data will be available through BODC. Scientific results will be published in refereed journals and in marine status reports (including ICES and MCCIP)

9.5 Proposed means to provide assistance in assessment or interpretation of data, samples and research results:
Through the Extended Ellett Line Annual Report (NOC research and consultancy reports.)

9.6 Proposed means of making results internationally available:
Final data will be available through BODC. Scientific results will be published in refereed journals and in marine status reports (including ICES and MCCIP)

10. Other permits Submitted

10.1 Indicate other types of coastal state permits anticipated for this research (received or pending):
None

11. List of Supporting Documentation

11.1 List of attachments, such as additional forms required by the coastal State, etc.:
N/A

Signature:

Contact information of the focal point:
Name: Dr N. Penny Holliday
Country: UK
Affiliation: National Oceanography Centre
Address: European Way, Southampton, Hampshire, SO14 3ZH
Telephone: 023 8059 6206
Email: penny.holliday@noc.ac.uk