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Evaluation report for bids for Seismic Survey 2003 for National Energy Authority, Iceland

Bjarni Richter, Harald Elstad

Greinargerð BR-HEL-2003-06

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Research Division

Report
BR-HEL-2003/06.

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Evaluation report for bids for Seismic Survey 2003 for National Energy Authority, Iceland.

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On May 16 a Tender document was sent, asking for bids on a Seismic Survey in areas on the Icelandic-Faeroese Ridge and Hatton Rockall Trough. In both these areas about 2000 km of high resolution seismic data was preferred. In all 4000 km, +/- 15%. The Tender document (appendix 1) was sent to the following companies, who all specialize in this kind of work and are all competent:

Compagnie Générale de Géophysique (CGG)
Fugro-Geoteam
Geophysical Service Incorporated (GSI)
Gardline Surveys
InSeis Terra
Petroleum Geo-services (PGS)
TGS-NOPEC Geophysical Company ASA
Veritas DGC
Western Geco
Multiwave Geophysical Co. ASA
Spectrum Energy and Information Technology Ltd.

The deadline for receiving bids was at 13:00 hours (GMT) on June 3rd 2003. 9 (nine) companies sent in a bid and they were as follows:

Geophysical Service Incorporat (GSI)
Cie Generale de Geophysique (CGG)
Multiwave Geophysical
TGS-NOPEC
Schlumberger (Western Geco)
Fugro Geoteam
PGS Geophysical
Gardline Geosurvey
Inseis Terra

Economic Evaluation

Immediately after receiving bids the evaluation started. The economic evaluation is as follows, and the least expensive offer is first and the most expensive last:

ORKUSTOFNUN
Research Division

Report
BR-HEL-2003/06.

09-06-2003

TGS-NOPEC - No weatherrisk			4000 km	3400 km	2800 km	Days
Field USD/km + Basic seis pr per km	$342.00	24,931.80 kr.	99,727,200.00 kr.	84,768,120.00 kr.	69,809,040.00 kr.	
Dayrates						0
Standby pr/hour	$770.00	56,133.00 kr.	8,083,152.00 kr.	8,083,152.00 kr.	8,083,152.00 kr.	6
Mob	$100,000.00	7,290,000.00 kr.	7,290,000.00 kr.	7,290,000.00 kr.	7,290,000.00 kr.	
Demob	$85,000.00	6,196,500.00 kr.	6,196,500.00 kr.	6,196,500.00 kr.	6,196,500.00 kr.	
			121,296,852.00 kr.	**106,337,772.00 kr.**	**91,378,692.00 kr.**	

PGS Geophysical			4000 km	3400 km	2800 km	Days
Field USD/km + Basic seis pr per km	$320.00	23,328.00 kr.	93,312,000.00 kr.	79,315,200.00 kr.	65,318,400.00 kr.	
Dayrates						0
Standby pr/hour	$1,375.00	100,237.50 kr.	14,434,200.00 kr.	14,434,200.00 kr.	14,434,200.00 kr.	6
Mob	$200,000.00	14,580,000.00 kr.	14,580,000.00 kr.	14,580,000.00 kr.	14,580,000.00 kr.	
Demob	$75,000.00	5,467,500.00 kr.	5,467,500.00 kr.	5,467,500.00 kr.	5,467,500.00 kr.	
Experimental work/Test per/hour	$1,800.00	131,220.00 kr.				
Seismic test processing	$45,000.00	3,280,500.00 kr.	3,280,500.00 kr.	3,280,500.00 kr.	3,280,500.00 kr.	
			131,074,200.00 kr.	117,077,400.00 kr.	103,080,600.00 kr.	

Cie Generale de Geophysique (CGG)			4000 km	3400 km	2800 km	Days
Field USD/km + Basic seis pr per km	$408.00	29,743.20 kr.	118,972,800.00 kr.	101,126,880.00 kr.	83,280,960.00 kr.	
Dayrates						0
Standby	$670.00	48,843.00 kr.	7,033,392.00 kr.	7,033,392.00 kr.	7,033,392.00 kr.	6
Mob	$106,000.00	7,727,400.00 kr.	7,727,400.00 kr.	7,727,400.00 kr.	7,727,400.00 kr.	
Demob	$53,000.00	3,863,700.00 kr.	3,863,700.00 kr.	3,863,700.00 kr.	3,863,700.00 kr.	
			137,597,292.00 kr.	**119,751,372.00 kr.**	**101,905,452.00 kr.**	

	USD	ISK				
Geophysical Service Incorporat (GSI)			4000 km	3400 km	2800 km	Days
USD/km - Basic Process	$62.50	4,556.25 kr.	18,225,000.00 kr.	15,491,250.00 kr.	12,757,500.00 kr.	
Dayrates	$38,328.00	117,352,670.40 kr.	117,352,670.40 kr.	117,352,670.40 kr.	117,352,670.40 kr.	42
Standby/day	$26,664.00	1,943,805.60 kr.	11,662,833.60 kr.	11,662,833.60 kr.	11,662,833.60 kr.	6
Mob	$203,000.00	14,798,700.00 kr.	14,798,700.00 kr.	14,798,700.00 kr.	14,798,700.00 kr.	
Demob	$101,500.00	7,399,350.00 kr.	7,399,350.00 kr.	7,399,350.00 kr.	7,399,350.00 kr.	
			169,438,554.00 kr.	**166,704,804.00 kr.**	**163,971,054.00 kr.**	

TGS-NOPEC-All weatherrisk (300%)			4000 km	3400 km	2800 km	Days
Field USD/km + Basic seis pr per km	$592.00	43,156.80 kr.	172,627,200.00 kr.	146,733,120.00 kr.	120,839,040.00 kr.	
Dayrates						0
Standby pr/hour	$770.00	56,133.00 kr.				0
Mob	$100,000.00	7,290,000.00 kr.	7,290,000.00 kr.	7,290,000.00 kr.	7,290,000.00 kr.	
Demob	$85,000.00	6,196,500.00 kr.	6,196,500.00 kr.	6,196,500.00 kr.	6,196,500.00 kr.	
			186,113,700.00 kr.	**160,219,620.00 kr.**	**134,325,540.00 kr.**	

Inseis Terra			4000 km	3400 km	2800 km	Days
Field USD/km + Basic seis pr per km	$512.00	37,324.80 kr.	149,299,200.00 kr.	126,904,320.00 kr.	104,509,440.00 kr.	
Dayrates						0
Standby pr/hour	$750.00	54,675.00 kr.	7,873,200.00 kr.	7,873,200.00 kr.	7,873,200.00 kr.	6
Mob/demob	$400,000.00	29,160,000.00 kr.	29,160,000.00 kr.	29,160,000.00 kr.	29,160,000.00 kr.	
			186,332,400.00 kr.	163,937,520.00 kr.	141,542,640.00 kr.	

ORKUSTOFNUN
Research Division

Report
BR-HEL-2003/06.

09-06-2003

Schlumberger (Western Geco)			4000 km	3400 km	2800 km	Days
USD/km - Basic process	$60.00	4,374.00 kr.	17,496,000.00 kr.	14,871,600.00 kr.	12,247,200.00 kr.	
Dayrates	$52,000.00	3,790,800.00 kr.	159,213,600.00 kr.	159,213,600.00 kr.	159,213,600.00 kr.	42
Standby pr/day	$52,000.00	3,790,800.00 kr.	22,744,800.00 kr.	22,744,800.00 kr.	22,744,800.00 kr.	6
Mob/demob	$250,000.00	18,225,000.00 kr.	18,225,000.00 kr.	18,225,000.00 kr.	18,225,000.00 kr.	
			217,679,400.00 kr.	**215,055,000.00 kr.**	**212,430,600.00 kr.**	

Gardline Geosurvey			4000 km	3400 km	2800 km	Days
Field USD/km + Basic seis pr per km	$308.00	22,453.20 kr.	89,812,800.00 kr.	76,340,880.00 kr.	62,868,960.00 kr.	
Dayrates	$26,000.00	1,895,400.00 kr.	79,606,800.00 kr.	79,606,800.00 kr.	79,606,800.00 kr.	42
Standby pr/day	$25,250.00	1,840,725.00 kr.	11,044,350.00 kr.	11,044,350.00 kr.	11,044,350.00 kr.	6
Mob/demob	$742,500.00	54,128,250.00 kr.	54,128,250.00 kr.	54,128,250.00 kr.	54,128,250.00 kr.	
			234,592,200.00 kr.	221,120,280.00 kr.	207,648,360.00 kr.	

Multiwave Geophysical _CONTACT			4000 km	3400 km	2800 km	Days
Field USD/km + Basic seis pr per km	$310.00	22,599.00 kr.	90,396,000.00 kr.	76,836,600.00 kr.	63,277,200.00 kr.	
Dayrates	$47,880.00	3,490,452.00 kr.	146,598,984.00 kr.	146,598,984.00 kr.	146,598,984.00 kr.	42
Standby pr/hour	$1,350.00	98,415.00 kr.	14,171,760.00 kr.	14,171,760.00 kr.	14,171,760.00 kr.	6
Mob	$150,000.00	10,935,000.00 kr.	10,935,000.00 kr.	10,935,000.00 kr.	10,935,000.00 kr.	
Demob	$40,000.00	2,916,000.00 kr.	5,467,500.00 kr.	5,467,500.00 kr.	5,467,500.00 kr.	
			267,569,244.00 kr.	**254,009,844.00 kr.**	**240,450,444.00 kr.**	

Fugro Geoteam			4000 km	3400 km	2800 km	Days
USD/km						
Dayrates/24 hours	$80,000.00	5,832,000.00 kr.	244,944,000.00 kr.	244,944,000.00 kr.	244,944,000.00 kr.	42
Standby/24 hours	$65,000.00	4,738,500.00 kr.	28,431,000.00 kr.	28,431,000.00 kr.	28,431,000.00 kr.	6
Mob/demob	$400,000.00	29,160,000.00 kr.	18,225,000.00 kr.	18,225,000.00 kr.	18,225,000.00 kr.	
			291,600,000.00 kr.	**291,600,000.00 kr.**	**291,600,000.00 kr.**	

Based on the economic evaluation, the bidders are ranked as follows

1: TGS-Nopec - No weather risk
2: PGS
3: CGG
4: GSI
5: TGS-Nopec - All weather risk
6: Inseis-Terra
7: Schlumberger (WesternGeco)
8: Gardline Surveys
9: MGC
10: Fugro Geoteam

Technical Evaluation

Inseis Terra

Inseis Terra is a Norwegian seismic company specialized in marketing and selling/licensing of multiclient geophysical data. The company has limited experience with seismic data acquisition. The seismic vessel offered for the job is M/V Mezen.

Vessel spec:

Flag:	Russian
Owner:	LARGE

Seismic Source type:	Bolt Long-Life 1500LL, 4200 or 6000 cu.in
Seismic Source output:	140 barm – 6000 cu.in
	118 barm – 4200 cu.in
Seismic Source P/B ratio	18 – 6000 cu.in
	16 – 4200 cu.in
Recording / streamer	Input/Output 24 bit – digital
Streamer length	Up to 8000 m
Navigation system	Spectra / Sprint
Streamer positioning	DigiCourse 5011 – 5010
Online navigation system	Fugro Starfix
Seismic processing	Ensign

The vessel is one of the largest 2D vessels in the market, is designed for 2D seismic acquisition, and is capable of towing a very long streamer.
The proposed processing company, Ensign is known as one of the best in 2D processing

Fugro Geoteam

Fugro Geoteam is a Norwegian seismic company specialized in 2D seismic acquisition and processing. The company has wide experience with 2D and 3D seismic data acquisition all over the world The seismic vessel offered for the job is Geo Baltic.

Vessel spec:

Flag:	Norwegian
Owner:	North Sea Shipping

Seismic Source type:	Sodera G-gun
Seismic Source output:	112 barm - 5240 cu.in (6 m depth)
Seismic Source P/B ratio	NA
Recording / streamer	Input/Output 24 bit – digital
Streamer length	Up to 10.000 m
Navigation system	Spectra / Sprint
Streamer positioning	Input/Output DigiBIRD 5011
Online navigation system	Fugro Starfix
Seismic processing	Fugro Geoteam

The vessel has very good reputation, and is well suited for the job

GSI

GSI is a small Canadian seismic company specialized in 2D and 3D seismic acquisition and processing offshore Canada. The company has limited experience outside Canada. The seismic vessel offered for the job is GSI Admiral

Vessel spec:

Flag:	Canadian
Owner:	GSI

Seismic Source type:	Bolt LL
Seismic Source	7860 cu.in output not specified
Seismic Source P/B ratio	NA
Recording / streamer	Input/Output 24 bit – digital
Streamer length	Up to 12.000 m
Navigation system	Spectra / Sprint
Streamer positioning	Input/Output DigiBIRD 5011
Online navigation system	Not specified
Seismic processing	Not specified

The vessel is well suited for the job

CGG

CGG is one of the largest seismic companies specialized in 2D and 3D seismic acquisition and processing. The company is located in France. The company has large world wide experience in 2D and 3D. The seismic vessel offered for the job is Akademik Lazarev

Vessel spec:

Flag:	Russia
Owner:	Sevmorneftegeofizika (SMNG)

Seismic Source type:	Russian airgun type
Seismic Source	4258 cu.in output not specified
Seismic Source P/B ratio	93.0 (6 m depth)
Recording / streamer	Syntrak 480 digital
Streamer length	6000 m
Navigation system	RGP-2D
Streamer positioning	Input/Output DigiBIRD 5011
Online navigation system	Fugro Starfix
Seismic processing	CGG

The vessel is technically suited for the job, but there are some language problems onboard. The working language on the boat is English, but not all the crew members understand or can speak English. In an emergency situation this can be a problem.

MGC

MGC is a small Norwegian company with limited experience in seismic acquisition. The company has only one vessel The seismic vessel offered for the job is Polar Princess

Vessel spec:

Flag:	Norway
Owner:	Polar Holding ASA

Seismic Source type:	Bolt LL
Seismic Source	3080 cu.in output 105.2 barm
Seismic Source P/B ratio	24.6 (5 m depth)
Recording / streamer	SERCEL digital
Streamer length	6000 m
Navigation system	Spectra/Sprint
Streamer positioning	Digicource 5011
Online navigation system	Fugro Starfix
Seismic processing	Spectrum

The vessel is well suited for the job.

Gardline Geosurvey

Gardline is a UK based company specialized in bathymetry surveying. The company's experience with deep water surveying is limited. The seismic vessel offered for the job is MV Sea Surveyor

Vessel spec:

Flag:	Bahama
Owner:	Gardline Shipping Ltd

Seismic Source type:	Bolt
Seismic Source	1310 cu.in
Recording / streamer	Geco HSSQ analog / Strataview 240
Streamer length	3000 m
Navigation system	Spectra/Sprint
Streamer positioning	Digicource 5011
Online navigation system	Fugro Starfix
Seismic processing	Gardline

The vessel is well suited for shallow water surveying, but is to small for deep water 2D acquisition. The seismic source is also to small for 2D deep water acquisition

Western Geco

WesternGeco is the largest seismic company in the world, with headquarter in Norway.
The vessel offered is Western Inlet

Vessel spec:

Flag:	Panama
Owner:	Seismic Shipping Inc.
Seismic Source type:	Sleeve gun
Seismic Source	3000 cu.in
Recording / streamer	Geco SSS / Input/Output MSX
Streamer length	6000 m
Navigation system	Spectra INS
Streamer positioning	Digicource 5011
Online navigation system	Fugro Starfix
Seismic processing	WesternGeco

The vessel is well suited for 2D work

TGS-Nopec

TGS-Nopec is an US company with office in Norway. All activity in Europe is administrated from Oslo. The vessel offered is Dmitrij Nalivkin

Vessel spec:

Flag:	Russian
Owner:	SMNG

Seismic Source type:	I/O Sleeve guns
Seismic Source	3410 cu.in
Recording / streamer	Sercel SEAL
Streamer length	3000 m
Navigation system	Spectra/Sprint
Streamer positioning	DigiBIRD 5011
Online navigation system	Fugro Starfix
Seismic processing	TGS-Nopec

The vessel is well suited for the 2D work offshore Island

PGS

PGS is one of the technically leading seismic companies, with headquarter in Norway. The vessel offered is Geo Explorer

Vessel spec:	
Flag:	Norwegian NIS
Owner:	Eidesvik & Co
Seismic Source type:	Sleeve guns / Bolt LL in combination
Seismic Source	3090 cu.in
Recording / streamer	Teledyne digital(PGS RDA)
Streamer length	6000 m
Navigation system	Spectra/Sprint
Streamer positioning	Digicource 5011
Online navigation system	Fugro Starfix
Seismic processing	PGS

This vessel is one of the best on the 2D market

Based on the technical evaluation, the bidders are ranked as follows

1: PGS
2: WesternGeco
3: TGS-Nopec
4: Fugro Geoteam
5: Inseis-Terra
6: CGG
7: GSI
8: MGC
9: Gardline Surveys

Conclusion

On the basis of this evaluation, TGS-NOPEC and PGS are the best option for the Seismic Survey off shore Iceland in the summer 2003. Both these companies are very capable in this line of work, but TGS-NOPEC offers a better price. Therefore it is our conclusion that discussions should be started as soon as possible with TGS-NOPEC.

Reykjavík, Iceland 9-6-2003

Bjarni Richter

Harald Elstad

Appendixes

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NATIONAL ENERGY AUTHORITY

Appendix 1

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15 May 2003

INVITATION TO TENDER

ACQUISITION AND PROCESSING OF
MULTICHANNEL SEIMIC REFLECTION DATA

1. INTRODUCTION

The National Energy Authority of Iceland plans to acquire approximately 2 million USDs worth of 2D seismic reflection data during the 2003 and 2004 field seasons. The data acquisition is part of preparations to submit information on the outer limits of the Icelandic Continental shelf to the UN Commission on the Limits of the Continental Shelf. The surveys will be conducted in selected areas that are of relevance to the definition of the Icelandic Shelf and will consist of a number of widely spaced regional lines.

2. SCOPE OF WORK FOR YEAR 2003

2.1 Survey areas

In 2003, surveys are to be conducted in two areas: Iceland-Faeroes Ridge and the Hatton-Rockall Area. The location of the two areas is given in Appendix 1.

2.2 Size of the survey programme

Taken together, the total size of of both survey programmes is expected to be 4000 km plus or minus 15%, split approximately evenly between the two survey areas.

2.3 Nature of the surveys

2.3.1 Iceland-Faeroes Ridge

2.3.1.1 Area

The survey area covers the southwestern slopes of the Iceland-Faeroes Ridge from the insular shelf of southeastern Iceland to the northwestern corner of the Hatton margin. Water depths in the survey area range from 750-2500 m.

2.3.1.2 Purpose

The purpose of the survey is to investigate the structure of the basement and, in particular, to ascertain whether sequences of seaward-dipping reflectors are present beneath the slopes.

2.3.1.3 Target

The ridge is a product of basaltic volcanism caused by seafloor spreading over the Iceland hotspot and its structure is thought to be similar to eastern Iceland, the western Faeroes shelf and other regions of seaward-dipping reflectors bordering the NE Atlantic margins. The sedimentary cover over the ridge is expected to be thin, less than one second two-way reflection time. The

basement surface is expected to be relatively smooth and a large acoustic impedance contrast probably exists across the basement surface.

2.3.1.4 Recording length
The recording length is expected to be 6-7 seconds two-way reflection time.

2.3.1.5 Survey layout
Regional lines, mostly dip-lines, each approximately 200 km in length.

2.3.2 Rockall Trough

2.3.2.1 Area
Southwestern part of the Rockall Trough.

2.3.2.2 Purpose
Map features of the Barra Volcanic Ridge System and its connection to the Charlie Gibbs Fracture Zone at the mouth of the Rockall Trough. Water depths over most of the survey area range from 2000-4000 m, extending to 1000 and 4500 m in the marginal parts.

2.3.2.3 Target
The southwestern Rockall Trough is characterized by an igneous basement composed of elongated volcanic ridges, the Barra Volcanic Ridge System, and an intervening complex of sills and sediments. The purpose of the survey is to map these igneous formations and investigate their nature and relationship to the overlying and partly interfingering sedimentary sequence. A further objective is to investigate the relationship between these ridges and similar features which are present in the Charlie Gibbs Fracture Zone at the mouth of the trough. Depths to the top of the volcanic basement mostly range from 4 to 7 seconds two-way reflection time.

2.3.2.4 Recording length
The recording length is expected to be 8-10 seconds two-way-time.

2.3.2.5 Survey layout
Strike and dip lines with respect to the ridge system, approximately 200 km in length.

2.4 Survey requirements

2.4.1 Survey periods

The surveys shall take place in the time period from June to August 2003. However, NEA may consider
accepting survey periods extending into September 2003 provided the Contractor is willing to take a substantial part of the weather risk.

2.4.2 Survey equipment requirements

The vessel and survey equipment must be fit for the purpose of the surveys and the need to image the targets as described in Section 2.3. They should meet good international standards for work under the expected survey conditions.

2.4.2.1 Optional equipment requirements
NEA may require services dependent on the following equipment or technical capability

- High-speed data link to transmit processed data to shore (cf. Section 2.4.4.1)
- Ability to acquire refraction data by using expendable sonobuoys.

2.4.3 Operational requirements

2.4.3.1 General

The operations must be carried out in a way that is fit for the purpose of the surveys and the need to image the targets as described in Section 2.3. They should follow good international practice under the expected survey conditions, especially as regards the efficiency and quality assurance of the data acquisition, the protection of health and the environment and the maintenance of safety and security.

2.4.3.2 Quality assurance and data quality

The Contractor will be required to operate a system to assure the quality of the survey operations and the data acquired, using acceptable international standards. Documentation of this system will be required.

The NEA will require a representative onboard the survey vessel at all times to monitor the survey operations and quality control. This will not, however, exempt the Contractor from the responsibility of maintaining an active quality control and delivering all products to the specified quality standard.

2.4.3.3 Mobilisation/demobilisation and Acceptance Test

For each survey, mobilisation shall include, but not be limited to:

- Planning and preparation of the survey.
- Test of digital recording instrumentation prior to leaving port.
- Calibration of all parts of the survey spread including the positioning systems.
- A kick-off meeting with NEA's representative prior to start of field work.
- Balancing of the streamer cable in the survey area.
- Calibration of all positioning systems at sea.
- Acceptance Test in the survey area to prove that each item of equipment as well as the complete survey spread is working according to specifications.
- Prepare a report with results and documentation of the surface positioning calibration for NEA's representative onboard.

For each survey, demobilisation shall include, but not be limited to:

- Post-survey calibration of the positioning systems.
- Shipment of data from designated harbour following the termination of the field work.
- Preparation of an Onboard QC Report as described in Section 2.4.5.1.

2.4.4 Data processing requirements

The Contractor is to process the navigation data and the seismic multichannel data.

2.4.4.1 Optional onboard processing of seismic reflection data

Based on availability and price, NEA will consider requiring processing of brute stacks to take place onboard the vessel during the cruise and a display of each processed line to be communicated to NEA for evaluation no later than one day after it is shot.

2.4.4.2 Seismic test processing
One or more lines from each survey will be chosen as test lines. Detailed tests on all relevant seismic processing parameters are to be carried out on these lines.

2.4.4.3 Basic seismic processing sequence
The following basic processing sequence is envisaged by the NEA:

- Reformat
- Resample in time domain, from 1 to 2 ms with anti-alias filter
- Signature deconvolution
- Trace edit
- Amplitude compensation
- NMO, using velocities picked on a 2 km interval
- Mute
- Stack
- Navigation/seismic data merge
- Deconvolution Fx
- Migration
- Filtering
- Scaling

2.4.4.4 Optional additional seismic processing
The NEA expects the Contractor to be able to provide, and will consider requiring the Contractor to carry out, additional processing steps. Such steps may include but not be limited to:

- Dip moveout
- FK filtering on common shot gathers
- FK demultiple
- Weighted stack
- Spectral flattening
- Generation of seismic attribute colour displays
- Reduction of processing window length
- Near and far trace gathers

2.4.4.5 Processing of navigation data
The Contractor shall process the navigation according to standard practice for regional 2D seismic surveys.

2.4.5 Reporting, end products and data delivery

2.4.5.1 Reports
The Contractor will be required to produce an Onboard QC Report and an Acquisition and Processing Report. The format, type of transmittal/storage medium and the number of copies required are specified in Table 1.

The Onboard QC Report is expected to have the following content:

- All field calibration results and appropriate calibration certificates.
- Completed workscope and appropriate maps.
- Diary of events.
- Timings.
- Equipment listings.

- QC logs relating to all data aquired.
- Summary of onboard processing if applicable.
- Performance.
- Areas of improvement / recommendations.

The Acquisition and Processing Report is expected to have the following content:

- Introduction.
- Field work summary.
- Location map (A4).
- Onboard equipment layout.
- Survey vessel and survey equipment.
- Field log summary and weather statistics.
- Field hour summary.
- Schedule of profiles.
- Diagram of seismic lines shot in more than one part showing shot point overlap.
- Streamer statistics (depths, noise, etc).
- Personnel.
- Records of safety incidents.
- Positioning systems, chains and parameters.
- Comparison between DGPS primary and secondary positions.
- Satellite coverage diagram.
- Survey datum (horizontal and vertical).
- Description and documentation of navigation processing.
- Description and documentation of seismic data processing.
- Appendix: Data examples
- Appendix: List of all original and processed deliveries.

2.4.5.2 Seismic reflection data

The Contractor will be required to deliver the seismic field data (field tapes, preferably in a demultiplexed SEG-Y format) as well as processed seismic data. The processed data is to include raw stack, filtered stack, filtered migration and seismic velocities. The formats, types of transmittal/storage/display media, scale and number of copies are specified in Table 1.

Display requirements: Seismic sections are to be plotted on film and a paper copy made from the film. A full legend is required for each seismic line. Velocity tables are to be plotted on top of the sections and crossing lines are to be indicated.

2.4.5.3 Navigation data

The Contractor will be required to deliver processed navigation data. The formats, transmittal/storage/display media, scale and number of copies are specified in Table 1.

2.4.5.4 Optional deliverables

The Contractor may be required to provide optional deliverables, such as:

- Processed seismic data in Landmark or Kingdom workstation format
- Processed sonobuoy data

- Additional plots of seismic sections or maps on film or paper copies from film.

Table 1. Overview of the format, scale, medium, number of copies and other specifications of the deliveries to be made by the Contractor according to Section 2.4.5.

Items to be delivered	**Format and other specifications**	**Scale**	**Medium**	**Copies**
Reports				
Onboard QC report	PDF or Word		Paper Digital: CD	2 2
Acquisition and processing Report	PDF or Word		Paper Digital : CD	2 2
Seismic data				
Seismic field data	Preferably demultiplexed, SEG-Y		Digital: Tape, type to be agreed	1
Processed seismic data				
Raw stack	SEG-Y*		Digital: Tape, type to be agreed	1
Filtered stack	SEG-Y		Digital: Tape, type to be agreed	
Filtered migration	SEG-Y	 Horizontal: 1:50,000 Vertical: 5 cm/sec-twt	Digital: Tape, type to be agreed Film print** Paper copy	1 1 1
Seismic velocities	ESSO V2		Digital: CD	1
Navigation				
Processed navigation data	UKOOA P1/90 WGS84		Digital: CD	1
Shotpoint map	WGS84, UTM projection,	1:500,000	Film print Paper copy	1 1
Optional deliverables -Processed seismic data in workstation format	Landmark, Kingdom		Digital: Tape, type to be agreed	1
-Sonobuoys	SEG-Y		Digital: Tape, type to be agreed Film print** Paper copy	1 1 1

* SEG-Y, 32 bits, full floating point, navigation data included in header
** Plots to contain full side label, velocity tables, crossing lines identified

3. BIDDING PROCESS

3.1 General information

3.1.1 What can be bid on?

Bids can be made for contract work in either of the two survey areas or in both.

3.1.2 Steps and time schedule until the contract is signed

3.1.2.1 Submission and opening of bids

Bids must be mailed or delivered in a sealed envelope to the National Energy Authority,
Grensasvegur 9, 108 Reykjavik, Iceland in an envelope marked "NEA – Seismic survey 2003"
The bids will be opened in the offices of the National Energy Authority at 1 p.m. GMT on June 3, 2003 and must be received by the Authority before that time. The opening will take place in the presence of the Authority's staff only.

3.1.3 Contract negotiations, selection of contractor and signing of the contract

NEA will enter into contract negotiations with one or more of the Bidders with the aim of selecting a contractor on the basis of the criteria given in Section 3.1.4. Target date for signing of the contract is 15 June 2003.

During contract negotiations, the Bidder will be asked to provide additional information
such as:

- Documentation of his system for quality assurance
- Documentation of his policy for health, safety and the environment
- Test signature of proposed airgun array.

3.1.3 Communication between NEA and the Bidder

Questions regarding the tender should be directed to Bjarni Richter, preferably through e-mail (br@os.is).

3.1.4 Selection of Contractor

NEA's overriding concern is to obtain a minimum of seismic coverage in both survey areas this summer in a way that is fit for the purpose of the surveys. Keeping this in mind, the Contractor or Contractors will be selected on the basis of the following key criteria, listed in a decending order of importance:

-Price/rates offered.

-Quality of services offered. Description of technical, operational and other survey specifications offered and their fitness for the purpose will play a key role in evaluating this aspect.

-Survey periods and starting deadlines offered with due regard to degree of weather risk the Contractor is willing to assume.

NEA reserves the right to seek independent third party advice in evaluating the bids.

3.1.5 Is the bid binding?

Bids should be considered binding for a period of 1 month fom the date of opening of the bids or until a contract has been signed with another bidder, whichever period is shorter. Companies not selected for contract work will be notified as soon as they are eliminated from the process.

3.1.6 Price adjustments

Any claims concerning price adjustments after the Contract has been signed must be specifically mentioned in the bid.

3.1.7 Caveats regarding funding and right to refuse all bids

NEA reserves the right to accept the bid or bids most appropriate to its needs (cf. Section 3.1.4). NEA also reserves the right to declare the bidding process null and void. The exact size of the programmes will also depend on NEA´s budget constraints.

3.2 Bid requirements

3.2.1 What the bid should contain

The bid should contain:

- Prices/rates.
- Survey specifications.
- Timing of surveys and of deliveries of end products.
- Caveats as appropriate.

3.2.2 Prices/rates

3.2.2.1 How prices are to be quoted

Prices are to be to be quoted in USDs.

Three types of prices should be quoted:

1) For the Mobilisation/demobilisation and Acceptance Test as described in Section 2.4.3.3: A fixed price.

2) For the Field Work (cf. Sections 2.1, 2.3., 2.4.2 and 2.4.3 except 2.4.3.3), Data Processing requirements (Section 2.4.4), Reporting, end products and Data Delivery (Section 2.4.5): Either day rates or rates per kilometre of subsurface surveyed with seismic measurements or a combination of the two.

3) For Optional Work (Sections 2.4.2.1, 2.4.4.1, 2.4.4.4, 2.4.5.4): For each item as appropriate.

These prices/rates shall include all services necessary to perform the work in a satisfactory manner and cover all normal consumables and necessary supplies. The Contractor is to be renumerated according to these prices only and the NEA should not have to make any other payments in connection with the work.

3.2.2.2 Shiptime chargeable to NEA in the form of day rates.

The use of shiptime should be broken down into categories according to the type of activity carried out. Normally, the breakdown should be be agreed upon between the Party Chief and the Client's Representative on a daily basis. NEA envisages the following categories will be used:

1) Operational time: Operations along survey lines.

2) Transit between survey area and port or between survey areas (except time belonging to
Mobilisation/demobilisation and Acceptance test).

3) Transit between survey lines.

4) Waiting on weather, sea state or any other environmental effect.

5) Other delays. This includes
-Deployment/recovering of equipment.
-Waiting for instructions from NEA.
-Waiting because of third party navigation not caused by Contractor's equipment.
-Vessel in port for scheduled crew changes or for port calls required by NEA, payment limited to 18 hours.
-Waiting on fishing activity.
-Time sharing due to seismic interference.
-NEA requested tasks not covered by the operational rates.
-Waiting for satellite coverage exceeding 6 hours.

6) Technical breakdown: Any delays caused by equipment malfunction or technical defect in the entire survey spread including the survey vessel.

In case the Bidder chooses to base his bid on day rates to some extent, use of shiptime in categories 1, 2, 3 and 5 may be charged to NEA in the form of such rates. Use of shiptime in category 4 may only partly be charged to NEA in the form of such rates. The Bidder should therefore specify how much of the risk due to downtime in category 4 he is willing to bear. NEA cannot be charged for use of shiptime in category 6.

3.2.3 Survey specifications

The Bidder is encouraged to propose survey specifications he deems fit for the nature and purpose of the surveys (cf. Section 2.3), especially as regards survey equipment and technical and operational parameters. If specifications are in some respect missing from the bid, the specifications given in Section 2.4 will be assumed in the evaluation of the bid. In case specifications missing from the bid are not covered by Section 2.4, established industry practice for the acquisition and processing of regional 2D seismic surveys under comparable environmental and geological conditions will be taken as a basis for evaluating the bid.

Important survey specifications include, but are not limited to, the following aspects:
-Vessel.
-Streamer, type, length, number of groups.
-Airguns, volumes, array type and expected signature.
-Recording equipment.
-Sampling interval.
-Shotpoint interval.
-Acquisition speed.
-Quality control.
-Positioning.
-Weather limitations on vessel and survey spread.
-Maximum time of survey operations without port call.

3.2.4 Timing of surveys and of deliveries of end products

3.2.4.1 Survey periods

The bid must specify a time window within which the survey or surveys will be carried out. As part of the contract negotiations, the Bidder will have to commit to a starting deadline.

3.2.4.2 Deadline for delivery of end products
The bid must specify a deadline for reporting and delivery of end products.

3.2.5 Caveats regarding the model contract
Any significant caveats regarding the general terms of the contract as specified in the model contract accompanying this Invitation to Tender must be stated explicitly in the Bid.

APPENDIX 1: MAP OF SURVEY AREAS

The approximate outlines of the two survey areas, Iceland-Faeroes Ridge and Rockall Trough, are shown on the map in Figure 1.

Figure 1