

Supplement No. 1

MULTI-CLIENT 2D/ SURVEYS, OFFSHORE CROATIA

This Supplement No. 1 of the Master Cooperation Agreement dated the 25 day of July 2013 is entered into between **The MINISTRY OF ECONOMY** ('MoE') and Spectrum Geo Ltd, part of the Spectrum group of companies ('Spectrum'), on the 25 day of June 2013. *Suit DA*

If this Supplement conflicts with the aforementioned Master Cooperation Agreement, the Supplement shall prevail.

1.0 Data Description

Subject to the terms and conditions of this Supplement and the Master Cooperation Agreement, Spectrum intends to conduct a new survey of approximately 12,000 km of 2D seismic Data as illustrated in Appendix A of this Supplement and thereafter to be processed in accordance with the technical information illustrated in Appendix B. Start up and the final volume of Data is dependent on the level of pre-commitment secured, ref clause 6.0 below.

2D/3D Survey	Area	Line Km
2D	Offshore Adriatic Sea	12000
Total		

Aneks br. 1

2D / SNIMANJE ZA VIŠE KLIJENATA, PODMORJA HRVATSKE

Ovo je Aneks broj 1 Glavnog Ugovora o suradnji od 25 . srpanj 2013. sklopljen između **Ministarstva gospodarstva** ('MINGO') i Spectrum Geo Ltd, dio Spectrum Korporacije ('Spectrum'), od 25 lipnja 2013. *SRPANS DA*

Ako je Aneks u sukobu sa spomenutim Glavnim Ugovorom o suradnji, primjenit će se odredbe Aneksa.

1.0 Opis Podataka

Prema rokovima i uvjetima ovoga Aneksa i Glavnog ugovora o suradnji, Spectrum namjerava provesti nova snimanja na oko 12.000 km 2D seismičkih Podataka, kao što je prikazano u prilogu A ovog Aneksa, a nakon toga će se obraditi u skladu s tehničkim informacijama prikazanim u prilogu B. Početna i konačna količina Podataka ovisiti će o količini narudbi za kupnju podataka, prema točki 6.0.

2D/3D Survey	Area	Line Km
2D	Offshore Adriatic Sea	12000
Total		

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2.0 Project Funding

Spectrum will fund the New Seismic Survey Data Acquisition, Processing, Interpretation, Sales, Marketing and Licensing of all surveys listed in Clause 1.0 above. All of the above will be at Spectrum's cost, ref clause 6.0 below.

The MoE will not be required to fund this project.

3.0 Revenue Share of Licence Fees

The parties have agreed a revenue sharing of the licensee fee for sale of the Data (after deduction of any taxes):

	Spectrum	MoE
First 5 Sales	100%	0%
All Sales thereafter	50%	50%

A sale in the above table is defined as the equivalent sale of the full data-set.

4.0 Period of Exclusivity

For five (5) Years from the date the processed Data is delivered to MoE, Spectrum shall have the exclusive right to market and license the Data to third parties as detailed in the Master Cooperation Agreement and this Supplement.

2.0 Financiranje Projekta

Spectrum će financirati novo snimanje seizmičkih podataka, obradu, interpretaciju, prodaju, marketing i licenciranje svega snimljenog kako je navedeno u točki 1.0. Sve gore navedeno će biti na trošak Spectruma, prema točki 6.0.

MINGO neće biti terećen za financiranje ovog projekta.

3.0 Podjela dobiti od naknada za Licence

Strane su suglasne da će dobit od naknade za licencu dijeliti (nakon odbitka svih poreza):

	Spectrum	MINGO
Prvih 5 prodaja	100%	0%
Sve kasnije prodaje	50%	50%

Prodaja u gornjoj tablici je definirana kao ekvivalent prodaje cijelog seta podataka.

4.0 Razdoblje ekskluziviteta

Za pet (5) godina od datuma kada su obrađeni Podaci dostavljeni MINGO-u, Spectrum ima isključivo pravo prodavati i licencirati Podatke trećim osobama, kako je navedeno u Glavnom Ugovoru o suradnji i ovom Aneksu.

5.0 Estimated License Fee

The estimated license fees for New 2D Seismic Survey data are as follows. Spectrum will be solely responsible for negotiating with potential buyers on the licenses to use the data and the corresponding fees. Spectrum may use the license fee mechanisms that it considers appropriate to ultimately obtain the highest revenue for both parties.

Early Pre-committers Single Company Licence Fee
e.g. US\$450.00 per km

Pre-committers Single Company Licence Fee
e.g. US\$550.00 per km

Late Sales rate Single Company Licence Fee
e.g. US\$650.00 per km

NOTE: These licence fees are subject to a minimum commitment survey size of 1,000 km

In the event of any party being awarded by MoE a Petroleum Agreement for acreage covered by the Non-Exclusive data acquired under the Survey Project Supplement, the following uplifts (defined as additional licence fees payable by licensee in the event of the licensee or potential licensee obtaining equity in a block over which data is available) in the data licensing rates will be imposed:

Block award uplifts (data already licensed)
US\$500.00 per km

Block award uplifts (data not previously licensed)
US\$950.00 per km

5.0 Procijenjena naknada za Licencu

Procijenjene naknade za Licence za novo snimljene 2D seizmičke podatke navedene su kako slijedi. Spectrum će biti isključivo odgovoran za pregovore s potencijalnim kupcima licenci, za korištenje podataka i za raspoređivanje naknada. Spectrum smije koristiti mehanizme naknade za licencu, po svom nahođenju, kako bi ostvario najveću dobit za obje strane.

Early Pre-committers za jednu kompaniju naknada za licencu
npr. US \$ 450,00 po kilometre

Pre-committers za jednu kompaniju naknada za licencu
npr. US \$ 550,00 po kilometre

Late Sales rate za jednu kompaniju naknada za licencu
npr. US \$ 650,00 po kilometru

NAPOMENA: Ove naknade uvjetovane su obvezom kupnje minimalno 1000 km snimane dužine.

U slučaju da je MINGO sklopio "Petroleum Agreement" na području koje obuhvaća novo ne ekskluzivno snimanje podataka, a u skladu sa snimanjem opisanim u ovom Aneksu, sljedeće dodatne naknade za licencu će biti određene:

Dodatna naknada bloka (podaci već licencirani)
US \$ 500,00 po kilometre

Dodatna naknada bloka (podaci nisu prethodno licencirani)
US \$ 950,00 po kilometru

Spectrum can offer discounted rates or "Partner" rates as per standard industry practice. Spectrum reserves the right to vary the above rates depending on technologies used and market conditions at the time of sale.

6.0 Schedule and Duration

The New Seismic Data survey is intended to commence as soon as possible from the date that all necessary permits have been obtained, subject to vessel availability and satisfactory pre-funding being obtained by Spectrum for the survey. The duration of the New Seismic Data survey acquisition and data processing will be a maximum of 7 months from the commencement of seismic data acquisition.

7.0 Miscellaneous.

Spectrum will, at its cost, assist the MoE with the organisation of a license round for the promotion of blocks offshore Croatia. This could include assistance in the determination of block sizes and license round grid, provision of road shows in London, Houston and Singapore, organisation of data rooms and workstations for potential licensees to view the data and attendance of two MoE staff at each event with their travel and accommodation expenses paid.

Spectrum may, at its discretion, produce additional data products including but not limited to Near, Mid & far offsets Angles and a fast model PSDM. Such products shall be subject to revenue share percentages as detailed in Clause 3.0 above, "Revenue Share of Licence Fees".

Spectrum može ponuditi diskontne cijene ili "partnerske" cijene u skladu sa standardima prakse u ovoj industriji. Spectrum zadržava pravo formirati cijene u skladu s upotrijebljenom tehnologijom i uvjetima na tržištu u vrijeme prodaje.

6.0 Raspored i trajanje

Novo snimanje seizmičkih podataka započet će što je prije moguće od dana kada će biti izdane sve potrebne dozvole, ovisno o dostupnosti broda i zadovoljavajućih količina sredstava za snimanje osiguranih od Spectruma. Novo snimanje seizmičkih podataka i obrada podataka trajat će maksimalno 7 mjeseci od početka prikupljanja seizmičkih podataka.

7.0 Razno.

Spectrum će, o vlastitom trošku, pomoći MINGO-u u organizaciji i promociji prodaje blokova u podmorju Hrvatske. To može uključiti pomoć u određivanju veličine, položaja i oblika blokova, pripremi promocije u Londonu, Houstonu i Singapuru, organizaciji "data rooms" i terminalima za potencijalne stjecatelje licence kako bi izvršili uvid u podatke te prisutnost dva člana MINGO tima na svakom događanju, uz plaćanje njihovih troškova puta i smještaja.

Spectrum može, po svom nahođenju, izrađivati dodatne podatke uključujući, ali ne ograničavajući se na, snimanje na različitim udaljenostima, dubinama i pod raznim kutevima i brzim modelom PSDM-a. Takvi podaci bit će predmetom podjele dobiti u postotku kako je navedeno u točki 3.0, "Podjela dobiti od naknade za Licencu".

8.0 Training

Spectrum shall provide training for one members of the MoE team as follows:

- 1) Acquisition stage – One MoE personnel for one month during the acquisition stage training.
- 2) Processing stage – One MoE personnel for one month during the processing stage training
- 3) Interpretation stage – One MoE personnel for one month during the interpretation stage training.

Reasonable training costs will be paid by Spectrum. Transport (Economy class return fare to training site), Accommodation at the place of training, and a per diem (to cover food, transport to/from the office and airport) will be provided by Spectrum. The MoE shall ensure, where applicable for data acquisition, such staff have the relevant safety training qualifications.

8.0 Obuka

Spectrum će pružiti obuku za jednog pripadnika MINGO-tima kako slijedi:

- 1) Faza prikupljanja podataka – Jedna osoba iz MINGO-a na jedan mjesec obuke tijekom prikupljanja podataka
- 2) Faza obrade podataka – Jedna osoba iz MINGO-a na jedan mjesec obuke tijekom obrade podataka
- 3) Faza interpretacije – Jedna osoba iz MINGO-a na jedan mjesec obuke tijekom faze interpretacije

Razumne troškove obuke snosit će Spectrum. Prijevoz (povrat troškova ekonomske klase do mjesta obuke), smještaj na mjestu obuke, i dnevnice (za pokrivanje troškova hrane, prijevoza do/iz ureda i zračne luke) osigurat će Spectrum. MINGO će osigurati, da kada njegovi članovi sudjeluju u prikupljanju podataka, imaju potrebne sigurnosne kvalifikacije.

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Made Effective on the 25. VII 2013

Stupa na snagu 25. VII 2013

Agreed for and on behalf of:

U ime i za račun:

MINISTRY OF ECONOMY

Spectrum Geo Ltd.

Ministarstvo gospodarstva

Spectrum Geo Ltd.

by:



by:



by:



by:



Name: IVAN
VRDOLJAK

Name: DAVID ROWLANDS

Naziv: IVAN
VRDOLJAK

Naziv: DAVID ROWLANDS

Title: MINISTR OF
ECONOMY

Title: EXECUTIVE
VICE PRESIDENT

Naslov: MINISTAR
GOSPODARSTVA

Naslov: EXECUTIVE
VICE PRESIDENT

Above Signature Witnessed by:

Above Signature Witnessed by:

Iznad Potpis Svjedok:

Iznad Potpis Svjedok:

Name:

Name: George Kovacic

Naziv:

Naziv: George Kovacic

Title:

Title: Consultant

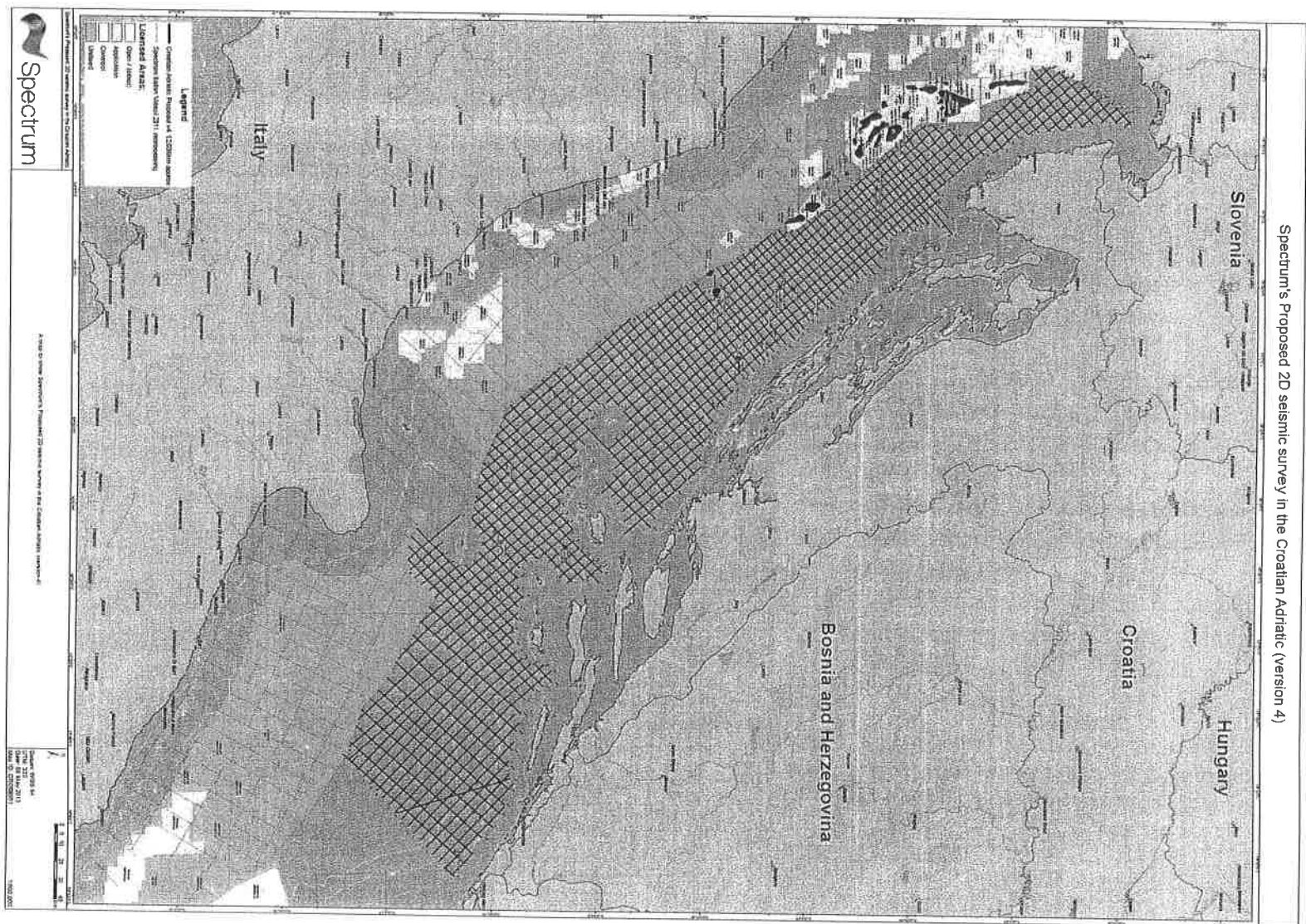
Naslov:

Naslov: Consultant



Appendix A - Map of Survey Project	Dodatak A - Karta postojeće upitnike
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Spectrum's Proposed 2D seismic survey in the Croatian Adriatic (version 4)



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Appendix B

Seismic Processing

The proposed processing flow is listed below. Actual processes and order will be determined by appropriate testing procedures and confirmation by Spectrum.

- Reformat, output to internal processing format.
- Low-cut Filter (4/18 Hz/db Oct.).
- Zero phase conversion – using a modelled source signature if available.
- Resample to 4 ms sample rate with application of zero phase anti-alias filter.
- Amplitude recovery - T^2 gain correction or similar.
- Swell noise attenuation.
- Coherent noise attenuation.
- Multiple attenuation – SRME.
- Adjacent trace summation.
- Initial velocity analysis (2km).
- Multiple attenuation using high resolution radon demultiple.
- Pre-migration bandpass filter.
- Common offset domain FX filter.(Optional)
- First pass Kirchhoff pre-stack time migration - 3 km aperture.
- Migration velocity analysis (1km)
- Second pass anisotropic (curved ray) Kirchhoff pre-stack time migration – 3 km aperture.

Dodatak B

Seizmička obrada

Predloženi tijek obrade (seizmički procesing ili obrada) naveden je u nastavku. Precizirani postupci i redosljed biti će određeni odgovarajućim ispitnim procedurama i potvrđeni od Spectrum-a

- Reformatiranje – prepis u interni format
- Uklanjanje niskih frekvencija (4/18 Hz/db Oct.).
- Konverzija u nultu fazu koristeći modeliranu signaturu izvora (ako je dostupna)
- Reuzorkovanje na 4ms uz primjenu anti-alias filtera
- Kompenzacija za vremenski ovisan gubitak amplituda (T^2 ujednačavanje ili slično)
- Prigušenje smetnji uzrokovanih nemirnim morem
- Uklanjanje koherentnih (organiziranih) smetnji
- Prigušenje površinski uvjetovanih višestrukih refleksa (SRME)
- Zbrajanje susjednih tragova
- Inicijalna (početna) analiza brzina (svakih 2km)
- Visoko-razlučivo uklanjanje višestrukih refleksa u RADON domeni
- Pojasno frekvencijsko filtriranje prije migracije
- Uklanjanje slučajnih smetnji u FX (frekvencija-prostor) domeni na zajedničkom *offsetu* (*opcija*)
- Kirchhoff pre-stack vremenska migracija – prvi prolaz (apertura 3km)
- Analiza brzina nakon migracije (svakih 1km)
- Kirchhoff pre-stack vremenska migracija (anizotropna) - drugi prolaz (apertura 3km)

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- Multiple attenuation using high resolution radon demultiple. (Optional)
- High density residual velocity analysis (4th order – *VELTUNE*).
- Inner and outer trace muting
- Stack
- Time and space varied bandpass filtering
- Data dependant scaling - 500ms alpha trimmed AGC.

- Visoko-razlučivo uklanjanje višestrukih refleksa u RADON domeni (opcija)
- Rezidualna analiza brzina ((4th order – *VELTUNE*).
- Rezanje tragova (vanjsko i unutarnje)
- Stack (sumiranje po zajedničkoj dubinskoj točki)
- Vremenski i prostorno promjenjivo pojasno frekvencijsko filtriranje
- Amplitudno ujednačavanje zavisno o podacima - *500ms alpha trimmed AGC*

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