


I. ANNEX

ISA Contract for Exploration – Public Information Template

	Type of resource: Polymetallic Nodules
	Name of Contractor: Global Sea Mineral Resources NV
Sponsoring State: Belgium	Contract Start: 14 January 2013
	Contract End: 14 January 2028
	Location: Clarion-Clipperton Zone

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Introduction

The information contained in this ISA Contract for Exploration – Public Information Template is made available to the public in response to the request by the Council of the ISA to make contracts publicly available, subject to restrictions on confidential information, industrial secrets and proprietary data.

The content of the present template is in accordance with the Regulations on Prospecting and Exploration for [*Polymetallic Nodules in the Area*] [*ISBA/19/C/17*] (the “Regulations”).

1. Contract Information

Annex III of the Regulations.

Type of resource	Polymetallic Resources
Name of Contractor	Global Sea Mineral Resources (GSR)
Contract Start	14 January 2013
Contract End	14 January 2028
Location	Clarion-Clipperton Zone
Contract Area (km²)	74,990 km ²

2. Coordinates and Illustrative Chart of the Exploration Area

Schedule 1 of Annex III of the Regulations.

The GSR Exploration area is located between:

*Table 1: List of coordinates for the turning points delineating the GSR contract area. * Coordinates initially included in the Contract. ** Revised coordinates compared to the coordinates included in the Contract. Coordinates are defined according to GCS : GCS WGS 1984 and Datum : WGS 1984*

Turning points	Longitude W [° decimal]	Latitude N [° decimal]
<i>Sub-part B2</i>		
1*	127.7667	15.2500
2*	127.7667	15.7333
3*	126.7000	15.7333
4*	126.7000	14.3333
5*	127.7667	14.3333
<i>Sub-part B4</i>		
1*	126.0000	15.7333
2*	125.3333	15.7333
3*	125.3333	13.7500
4*	126.0000	13.7500
<i>Sub-part B6</i>		
P1**	123.9520	15.7260
P2**	122.3333	15.7260
3*	122.3333	14.1667
4*	122.7500	14.1667
5*	122.7500	13.3500
6*	123.0000	13.3500
7*	123.0000	12.9333
8*	123.5833	12.9333
9*	123.5833	14.0833
10*	123.9250	14.0833

The shapefile format of the entire GSR Contract Area, including blocks B2, B4 and B6 has been attached together with the electronic version of the submitted document.

3. Plan of Work

Summary of Plan of Work for Exploration including the Programme of Activities for the first and/or the current 5-year period (Regulation 18).

The first 5-year exploration phase allowed GSR to collect necessary resource definition data, baseline data to characterize the environment, and also to trial the PATANIA I (prototype vehicle) in the complex and challenging environment of the deep sea. Since 2013, GSR has successfully conducted 4 exploration campaigns (GSRNOD14, GSRNOD15, GSRNOD17 & CIIC[GSR]NOD18) in the dedicated contract area of the Clarion Clipperton Zone (CCZ). Extensive reporting on these intensive field activities document the detailed observations, analyses and assessment outcomes. All exploration campaigns were set up in close

interactive collaboration with international research and development programs and institutes including the Marine Biology (MarBiol) and the Marine Geology (RCMG) of Ghent University, Woods Hole Oceanographic Institution (WHOI), Behre Dolbear, and Massachusetts Institute of Technology (MIT). Outcomes reflect up-to-date technical expertise and environmental experience. The three first campaigns (GSRNOD14, GSRNOD15 and GSRNOD17) focused on environmental baseline studies in the GSR Contract area, as well as developing the mineral resource definition. Furthermore, a first experimental Tracked-Soil-Testing-Device (TSTD) "PATANIA I" was developed in order to test the trafficability of caterpillar tracks on the seafloor, 4,500 m below the sea surface. This successful test occurred during the 2017 expedition (GSRNOD2017), the first major milestone in the development of this deep-sea technology.

Activities performed during Years 1 to 5 of the GSR Exploration Contract are summarized below:

- 1) Oceanographic and environmental study areas: meteorological and surface oceanographic conditions, and full water column oceanographic mooring installations, cetacean activity, fish and nekton, benthic fauna in the sediment (meiofauna, macrofauna, megafauna and benthic scavengers, bioturbation and environmental analysis of sediments, benthic genetic analysis, benthic microbial community analysis) and nodule-associated biota.
- 2) Geological, geostatistical and geotechnical studies: low-resolution mapping of the entire contract area and high-resolution mapping of 3 x 200km² areas of interest, nodule and sediment analyses (geochemistry, physical properties, etc.), geostatistical study and resource definition of polymetallic nodules in the contract areas (at different levels of confidence) and geotechnical analysis of the upper soft sediment (in-situ shear strength measurements up to 4 m deep).
- 3) Technology development: propulsion, nodule collector and integration of a nodule collector have been studied during the first 5-year programme, also including the in-situ test of a tracked soil testing device named Patania I in 2017. A desk study of the processing and metallurgical extraction was also performed during this period.
- 4) Training development: several high-level trainings (fellowship, internships, professional trainings, etc.) were offered by GSR during the first 5-year period to 10 candidates selected by the Authority.

The scope of work of Years 6 to 10 of the GSR Exploration Contract was explained in the Proposal of our Periodic Report (Periodic Review 1: Initial Proposal for the Plan of Work for Years 6 - 10 of Exploration - ISA-GSR_PR1_2019) and remains applicable. "Responses to clarifications requested by the International Seabed Authority" (submitted to the Authority in July 2020 - P03-GSR-LG-LET-00001) - clarifications were given to questions posed by the Authority. A summary of the Years 6 to 10 are presented on the table below:

	Year 6 - 2019	Year 7 (*) - 2020	Year 8 (*) - 2021	Year 9 (*) - 2022	Year 10 (*) - 2023
Resource definition	<ul style="list-style-type: none"> - Modelling of the polymetallic nodule resources in the GSR contract area - Identification of potential mining areas and Preservation Reference Zone(s) 	<ul style="list-style-type: none"> - Submission of the first version of the report for polymetallic nodule resource assessment - Improved processing of the 2015 AUV imagery for resource assessment 	<ul style="list-style-type: none"> - Collection of physical samples (box-cores) for resource definition in sub-block B4 - Collection of additional AUV imagery in selected areas of interest 	<ul style="list-style-type: none"> - Geochemical analyses of the 2021 nodule samples to improve knowledge on the spatial variation in content - Models update, resource assessment of B4 	<ul style="list-style-type: none"> - Submission of the second version of the report for polymetallic nodule resource assessment
Environmental studies	<ul style="list-style-type: none"> - Continuous laboratory analysis and desk-study regarding baseline and environmental impact assessment studies - Development of conceptual monitoring plan - Life cycle assessment of polymetallic nodule collection & processing and comparison with land-based exploitation 	<ul style="list-style-type: none"> - Continuous laboratory analysis and desk-study regarding baseline and environmental impact assessment studies - Environmental Scoping Report development - Expert workshop to elicit feedback, advice for Scoping Report - Preparation of offshore expeditions - Development of conceptual monitoring plan - Life cycle assessment of polymetallic nodule collection & processing and comparison with land-based exploitation 	<ul style="list-style-type: none"> - Environmental baseline offshore campaign - Environmental impact assessment of Patania II trial - Joined project with MiningImpact 2 for the environmental effect assessment of the PPV Patania II - Continuous laboratory analysis and desk-study regarding baseline and environmental impact assessment studies 	<ul style="list-style-type: none"> - Environmental baseline offshore campaign, including a re-visit to the Patania II CCZ trial sites - Continuous laboratory analysis and desk-study regarding baseline and environmental impact assessment studies - EIS submission for the SIT 	<ul style="list-style-type: none"> - Continuous laboratory analysis and desk-study regarding baseline and environmental impact assessment studies - EIA and EIS development as part of the submission of a plan of work for an Exploitation contract
Technology development	<ul style="list-style-type: none"> - In situ trial of the Patania II in the CCZ – <i>Postponed due to technical failure of the power and communications cable (umbilical)</i> - Dynamic analysis and development of the new LARS - Detailed Engineering Front-End Engineering/Design (FEED) Study - Lab scale testing, prefeasibility stage, & selection of the best metallurgical process 	<ul style="list-style-type: none"> - Dynamic testing of the new LARS system & in situ assessment of the LARS/Patania II in the High Seas and Belgian EEZ - Detailed Engineering Front-End Engineering and Design (FEED) Study - Pre-pilot & Pilot plan development for the metallurgical processing 	<ul style="list-style-type: none"> - Feasibility stage of the system integration test (propulsion, nodule collection, vertical transport, transhipment, batch processing) - Pre-pilot & Pilot plan development for the metallurgical processing 	<ul style="list-style-type: none"> - Development of the Integrated System - Computational Fluid Dynamics (CFD) modelling - Construction of the Integrated System - Demo plan of the metallurgical process permitting & design 	<ul style="list-style-type: none"> - System Integration Trial in the CCZ, from seabed to surface (or 2024) - Demo plan of the metallurgical process design, procurement & build

Training program for trainees of developing countries	<ul style="list-style-type: none"> - 2 offshore internship training (postponed to 2020 due to cancellation of the 2019 offshore campaign after Umbilical failure and postponed a second time to 2021 due to the COVID-19 related delays). - (from first 5-years training program – reported to 2021) 	<ul style="list-style-type: none"> - 1 x fellowship training for master degrees (Ocean & Lakes – BE) - 1 x fellowship training for master degree (Emerald – BE) - 1 x professional training for Seminar on dredging technologies at the Antwerp Port Training Center (APEC) 	<ul style="list-style-type: none"> - 2 x professional training on board of GSR vessels during the GSR offshore campaign. - 2 x professional education at the International Seabed Authority for data integration (professional training at Rhodes Academy to be replaced - To be confirmed by ISA) 	<ul style="list-style-type: none"> - 1 x fellowship training for master degrees (Ocean & Lakes – BE) - 1 x fellowship training for master degree (Emerald – BE) - 1 x offers for Seminar on dredging technologies at the Antwerp port training Center 	<ul style="list-style-type: none"> - N.A
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It must be noted however that, due to the technical difficulties faced with the launch and recovery system (LARS) during the first attempted *in situ* trial of the GSR pre-prototype vehicle PATANIA II in 2019, additional steps have been considered in the de-risking strategy, focusing on the dynamic behavior of the umbilical cable.

These additional steps (offshore testing in the High Seas and Belgian EEZ), along with logistical complications encountered in 2020 due to COVID-19, have caused some delays in the long-term planning of GSR.

4. Programme of Activities and Exploration Expenditure

Section 4.1 of Annex IV of the Regulations and Schedule 2 of Annex III of the Regulations.

I. Agreed 5-year Programme of Activities

5-year Programme of Activities	First	Second	Third	Extension
General Objectives	Objective		Description	
	Year 1: Collection and analysis of historical data		Collect historical data from the GSR contract area and integrate into GIS software.	
	Metocean Data Acquisition		Deployment of a long-term metocean buoy in the area.	
	Global Mapping of the area under application		Hydrographical and geophysical campaign using multibeam echosounder (MBES), side-scan sonar (SSS) and seismic equipment.	
	Data processing		Generate maps (bathymetry, backscatter, slopes...)	
	Data integration and interpretation		Selection of 10 zones of interest inside the contract area.	
	Years 2 to 5 (inside the 10 zones selected the first year):			
	Bottom water conditions		Current, temperature, conductivity, turbidity and other measurements	
High-resolution seabed and sediment mapping		Using deep-towed equipment and/or Autonomous Underwater Vehicle		

		(AUV) to collect high-resolution MBES / SSS / Seismic / Imagery
	Camera observation of spot zones	Imagery of the seabed for morphological, nodule abundance, description of megafauna
	Sampling on spot zones	With box-corer sampler and multicorer
	Data processing	Elaboration of digital terrain model and isopach maps + imagery analysis
	Seawater chemical analysis	Temperature, salinity, total alkalinity, pH and dissolved oxygen, organic & inorganic material
	Sediment and interstitial water analysis	Visual description / mineralogy / Geotechnical identification + chemical analysis of the sediment and interstitial water
	Biological analysis	Phytoplankton, Zooplankton, fish, marine mammals and seabirds, micro-organisms, meio- and macrofauna, megafauna, benthic scavengers, bioturbation, bio/geo linkages and genetic AND identifications
	Nodule analysis	Abundance, visual description, mineralogy, chemical analysis and mechanical properties
	Data integration, interpretation and reporting	Definition of potentially mineable fields based on geostatistical models for the resource definition, along with habitat mapping. Reports are submitted annually and every 5 years.

II. Results achieved during reported first 5 years

Annual objectives and activities			
Year	No.	Agreed Objectives	Objective: Completed, Modified, Postponed or Replaced
Year 1 (2014)	1	Collection and analysis of historical data	Objectives 1 to 4 were successfully achieved during Year 1. Objective 5 (data integration and interpretation) was postponed, as further analyses were still ongoing at the end of the year. All information has been duly reported to the Authority in the annual report (ISA-GSR_AR2014)
	2	Metocean Data Acquisition	
	3	Global Mapping of the area under application	
	4	Data processing	
	5	Data integration and interpretation	
Year 2 (2015)		Investigate 2 to 3 areas with:	Objectives 1 to 10 were successfully completed during Year 2, with the successful offshore expedition GSRNOD15A and the completion of all objectives in selected areas of interest B4S03, B4S02 and B4N01. All preliminary results of this campaign were reported in the annual report (ISA-GSR_AR2015). Two additions (multibeam survey in the APEI 3 and in-situ geotechnical measurement) and one deletion (epibenthic sledge), due to absence of available equipment, were made to the programme of activities.
	1	Bottom water conditions	
	2	High-resolution seabed and sediment mapping	
	3	Camera observation	
	4	Sampling on spot zones	
	5	Data processing	
	6	Seawater chemical analysis	
	7	Sediment and interstitial water analysis	
	8	Biological analysis	
	9	Nodule analysis	
10	Data integration, interpretation and reporting		
Year 3 (2016)		Contractual objectives were the same than Year 2 As part of the modified objectives, GSR focused on:	Contractual objectives 1 to 10 were modified and timely notified to the Authority by letter dated 31 March 2016 to the Secretary-General, invoking Appendix IV Section 4.3 (pp. 42-43) of the Contract for Exploration.
	1	the analysis and interpretation of the data obtained during the first two exploration surveys conducted by GSR in 2014 and 2015;	
	2	the development and the construction of the first in-situ Tracked Soil Testing Device "PATANIA I" and	

	3	the development of a laboratory test of the GSR collector head. Both engineering development will be executed during the Year 2017.	
Year 4 (2017)		Contractual objectives were the same as Years 2 and 3. Modified objectives have been defined as below:	On the basis of Appendix IV Section 4.3 of the Contract for Exploration, modified objectives concerned the “detailed exploration on the areas of interest defined during the first year of exploration (...) each year, the Contractor will investigate two to three areas”.
	1	In-situ terra-mechanical tests of the GSR tracked soil testing device “PATANIA I”;	During Year 4, GSR performed its third expedition in its contract area (GSRNOD17) and was able to complete all modified objectives of Year 4.
	2	Deployment of short and long environmental moorings for monitoring currents to assist with the development of a hydrodynamic model that will be used to model sediment plumes. The moorings were also used during the deployment of the PATANIA to conduct sediment plume monitoring	The first Tracked Soil Testing Device “PATANIA I” was successfully deployed on the CCZ seabed, at 4,500m. Meanwhile, GSR also carried out an important hydraulic collector test in laboratory, over a period of 3 months. These two activities were included in the project ProCat, with the final purpose to launch the integrated pre-prototype vehicle “PATANIA II”.
	3	Environmental test – plume monitoring - created by tracks and using a water pump installed on the PATANIA. Qualitative test to assess monitoring techniques;	In order to achieve this milestone for future deep-sea exploitation and safely deploy the TSTD vehicle PATANIA I, GSR had to focus its activities on the 3 areas of interest already investigated during the 2015 offshore campaign (GSRNOD15A): sub-areas B4S03, B4S02 and B4N01.
	4	Collection of additional soil and water samples to improve baseline knowledge on several scientific topics, and most specifically on the biological aspects;	In light of the ongoing activities performed by GSR for the deep-sea mining test that was planned for the first part of 2019 (GSRNOD19) and the intensive preparation required, together with the partners of JPI Oceans and within our Flemish project ProCat, GSR concluded that it was necessary and prudent,
	5	Collection of a large quantity of nodules for further	as well as in accordance with good mining

	6	metallurgical and geochemical analyses; Data and sample processing for biological, geological, geotechnical environmental and technological studies;	industry practice, to adapt the programme of activities for 2018.
	7	Data Integration to the ArcGIS database and interpretation;	
	8	Reporting	
Year 5 (2018)	1	Modified objectives have been defined as below: Interpretation of the GSRNOD17 results, integration with the previous GSR data collected during the first 2 campaigns (GSRNOD14A & GSRNOD15A) and historical data;	<p>All modified objectives were completed during Year 5, except item 2 (completion of the resource definition report), which still required more time before final submission. All results were summarized and presented to the Authority in the Annual Report ISA-GSR_AR2019.</p> <p>It was also recalled to the Authority that, in 2017, GSR and the Cook Islands Investment Corporation (CIIC) signed a collaboration agreement for the development and exploration of the polymetallic nodule resources in the CIIC Contract Area, sponsored by the Cook Islands, of the CCZ (see GSR Annual Report of 2017 – document reference ISA-GSR_AR2018).</p> <p>In the framework of this agreement, GSR and CIIC conducted a joint research expedition (CIIC[GSR]NOD18) from 02/02/2018 to 29/03/2018 in the Contract Area of the CIIC and also collected geological, geotechnical and physical oceanography baseline data in the GSR Contract Area.</p> <p>The latter included collection of box-core samples for geological and geotechnical analysis and the recovery and redeployment of the environmental bottom moorings, to further enhance the physical oceanographic baseline data set for GSR's contract area.</p>
	2	Completion of the resource definition report type NI43-101 based on all reliable sample data gathered by GSR.	
	3	Development and construction of the GSR deep-sea pre-prototype collector PATANIA II;	
	4	Elaboration of the Environmental Impact Assessment (EIA) to be submitted to the Authority in relation to the planned trial of the pre-prototype collector	
	5	Preparation of the 2019 offshore campaign (GSRNOD19), in partnership with the Joint Programming Initiative Healthy and	

	Productive Seas and Oceans (JPI Oceans).	
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5. Training Programme

Schedule 3 of Annex III of the Regulations.

I. Training Programme

Type of training	Professional: Dredging Technologies Seminar	Educational: Rhodes Academy on Oceans Law and Policy	Internship: Participation to the GSR offshore expedition	Master of Science: Marine and Lacustrine Science and Management "Oceans & Lakes"
Institutions	Port training centre of Antwerp and Flanders (APEC)	Center for Oceans Law & Policy	GSR – Global Sea Mineral Resources	Free University of Brussels, Antwerp University and Ghent University
Duration	2 weeks	3 weeks	4 to 6 weeks	2 years
Scope	Professional training- Dredging Technologies Seminar	Professional Education - Laws of the Sea	Internship training	Fellowship training
Fields	Offshore/marine engineering	Legal	Applied technologies & Sciences	Geology/Biology
Qualification required	Bachelor / Masters	Masters	Bachelor / Masters	Bachelor
Financing	Covered by GSR	Covered by GSR	Covered by GSR	Covered by GSR

II. Trainings conducted up to reported years

Start year	End Year	Name of Trainee	Nationality	Gender	Type of Programme	Details	Duration
2016	2018	Carolina Camargo	Brazilian	F	Fellowship	Master "Oceans and Lakes"	2 years
2017	2017	Talatu Akindoline	Nigerian	F	Professional Education	Rhodes Academy on Oceans Law and Policy	3 weeks

2017	2017	Ana Clara Coni e Mello	Brazilian	F	Professional Training	Dredging Technologies Seminar	2 weeks
2018	2020	Shymbalio va Nadzeyan	Belarusian	F	Fellowship	Master "Oceans and Lakes"	2 years
2018	2018	Rochelle Lee	Jamaican	F	Professional Education	Rhodes Academy on Oceans Law and Policy	3 weeks
2018	2018	Thiha Thiha Thwin	Burmese	M	Professional Education	Rhodes Academy on Oceans Law and Policy	3 weeks
2018	2018	Daniellia Aitcheson	Jamaican	F	Professional Training	Dredging Technologies Seminar	2 weeks
2018	2018	Elle Pathirathnalage Thilakarathne	Sri Lankan	M	Professional Training	Dredging Technologies Seminar	2 weeks
2019	2019	Fermin Palma	Argentinian	M	Professional Internship	Internship on GSRNOD 19 expedition	4 - 6 weeks
2019	2019	Sayakkara Mesthrilage Athukorala	Sri Lankan	F	Professional Internship	Internship on GSRNOD 19 expedition	4 - 6 weeks

III. Completed Trainings per Year

	[Name of the programme described in the Contract]	[Name of the programme described in the Contract]	[Name of the programme described in the Contract]
Year 1			
Year 2			
Year 3	Master "Oceans and Lakes" (x 1 Trainee)		
Year 4		Rhodes Academy on Oceans Law and Policy (x 1 trainee)	Dredging Technologies Seminar (x 1 trainee)
Year 5	Master "Oceans and Lakes" (x 1 Trainee)	Rhodes Academy on Oceans Law and Policy (x 2 trainees)	Dredging Technologies Seminar (x 2 trainees)
Year 6	Internship on GSRNOD19 expedition (x 2 trainees)		

6. Standard clauses

Annex IV of the Regulations.

Please find it available online at page 36: https://isa.org.jm/files/files/documents/isba-19c-17_0.pdf