I. ANNEX

ISA Contract for Exploration – Public Information Template

BGR Federal Institute for Geosciences and Natural Resources	Type of resource: Polymetallic Sulphides
	Name of Contractor: Federal Institute for Geosciences and Natural Resources (BGR)
	Contract Start: 06 May 2015
Sponsoring State: Germany	Contract End: 05 May 2030
	Location: Central- and Southeast Indian Ridge, Indian Ocean

Contents

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 Sulphides in the Area*] [*ISBA/16/A/12 Rev. 1*] (the "Regulations").

1. Contract Information

Annex III of the Regulations.

Type of resource	Polymetallic Sulphides
Name of Contractor	Federal Institute for Geosciences and Natural Resources (BGR)
Contract Start	06 May 2015
Contract End	05 May 2030
Location	Central- and Southeast Indian Ridge, Indian Ocean
Contract Area (km^2)	5,000 after relinquishment of 50% of the contract area

2. Coordinates and Illustrative Chart of the Exploration Area

Schedule 1 of Annex III of the Regulations.

According to the regulations, 100 “polymetallic sulphide blocks” were defined as squares, each 10 by 10 kilometers, with an area of 100 km^2. The blocks were arranged in 12 non-contiguous clusters, and the minimum number of blocks per cluster was five. The blocks in each cluster were contiguous. In total, the size of the original licensed area was 10,000 km^2.

The 12 clusters were confined within a rectangular area (red in Fig. 1) which was defined by the following coordinates:

Upper left: Longitude 68.674922 and Latitude -20.923030 Decimal Degrees
Upper right: Longitude 66.854634 and Latitude -22.124658 Decimal Degrees
Lower left: Longitude 72.458265 and Latitude -29.048890 Decimal Degrees
Lower right: Longitude 74.290450 and Latitude -27.763981 Decimal Degrees

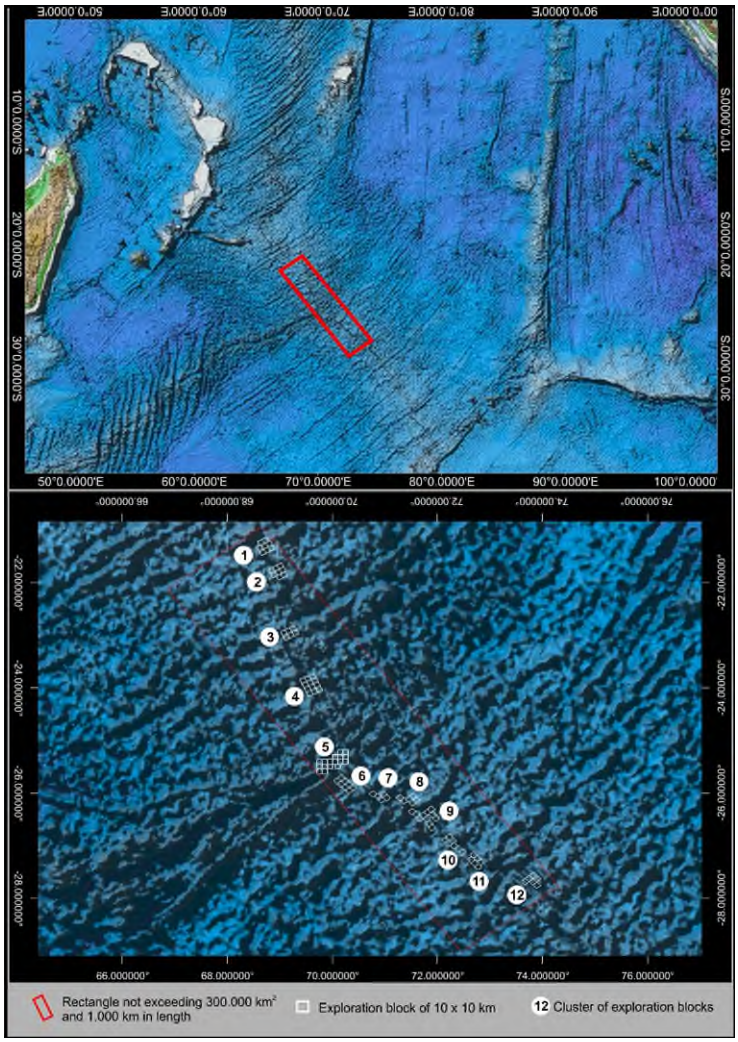

Figure 1: Upper panel: Location of the BGR contract area in the Indian Ocean. Lower panel: Division of the contract area into 12 clusters.

This confining rectangle had a long side of 949.8 km (max. 1000 km) and a short side of 228.7 km (max. 300 km), its area was approx. 217,200 km^2 (max. 300,000 km^2).

According to ISBA/16/A/12/REV1 and ISBA/25/LTC/8 each contractor on the exploration of massive sulphides is obliged to relinquish 50% of its contract area 8 years after the start of the exploration contract. Due to the COVID pandemic BGR was granted a one year deferral of this relinquishment (ISBA/27/C/19) and thus, BGR relinquished 50% of its contract area by 5th of May 2024.
During the second part of the twenty-ninth session, held from 1 to 12 July 2024, on the basis of the technical review carried out by the secretariat, the Legal and Technical Commission noted that BGR had complied with its relinquishment obligations pursuant to the applicable regulations and the recommendations for the guidance of contractors on the relinquishment of areas under exploration contracts for polymetallic sulphides or cobalt-rich ferromanganese crusts (ISBA/25/LTC/8). The Council was invited to take note of this (ISBA/29/C/16).

BGR relinquished cells within entire blocks. The blocks which remain with the contractor after this first relinquishment are shown in the following Table 1 and in Figure 2

Table 1: INDEX blocks remaining at BGR after the first relinquishment. Block numbers correspond to the numbers from the originally allocated contract area.

INDEX_Cluster	INDEX_Block	INDEX_Point	INDEX_LonDD	INDEX_LatDD
4	24	1	69.47012852	-23.80086247
4	24	2	69.55887075	-23.76227623
4	24	3	69.60084843	-23.84392273
4	24	4	69.51206408	-23.88253349
4	25	1	69.55887075	-23.76227623
4	25	2	69.64755976	-23.72363984
4	25	3	69.68957922	-23.80526171
4	25	4	69.60084843	-23.84392273
4	26	1	69.42322626	-23.9210937
4	26	2	69.51206408	-23.88253349
4	26	3	69.55405312	-23.96419131
4	26	4	69.46517278	-24.0027761
4	27	1	69.51206408	-23.88253349
4	27	2	69.60084843	-23.84392273
4	27	3	69.64287965	-23.92555587
4	27	4	69.55405312	-23.96419131
4	28	1	69.60084843	-23.84392273
4	28	2	69.68957922	-23.80526171
4	28	3	69.73165231	-23.88687005
4	28	4	69.64287965	-23.92555587
4	30	1	69.55405312	-23.96419131

INDEX_Cluster	INDEX_Block	INDEX_Point	INDEX_LonDD	INDEX_LatDD
4	30	2	69.64287965	-23.92555587
4	30	3	69.68496477	-24.00717551
4	30	4	69.59609595	-24.0458358
4	31	1	69.64287965	-23.92555587
4	31	2	69.73165231	-23.88687005
4	31	3	69.77377936	-23.96846473
4	31	4	69.68496477	-24.00717551
4	33	1	69.59609592	-24.04583584
4	33	2	69.68496477	-24.00717551
4	33	3	69.72710408	-24.08878153
4	33	4	69.63819292	-24.12746683
4	34	1	69.68496477	-24.00717551
4	34	2	69.77377936	-23.96846473
4	34	3	69.81596071	-24.05004561
4	34	4	69.72710409	-24.08878151
5	35	1	70.10675193	-25.18060411
5	35	2	70.20568793	-25.18060411
5	35	3	70.20568793	-25.27090082
5	35	4	70.10675193	-25.27090082
5	37	1	70.00781593	-25.27090082
5	37	2	70.10675193	-25.27090082
5	37	3	70.10675193	-25.36119753
5	37	4	70.00781593	-25.36119753
5	38	1	70.10675193	-25.27090082
5	38	2	70.20568793	-25.27090082
5	38	3	70.20568793	-25.36119753
5	38	4	70.10675193	-25.36119753
5	41	1	69.80994393	-25.36119753
5	41	2	69.90887993	-25.36119753
5	41	3	69.90887993	-25.45149424
5	41	4	69.80994393	-25.45149424
5	42	1	69.90887993	-25.36119753
5	42	2	70.00781593	-25.36119753
5	42	3	70.00781593	-25.45149424
5	42	4	69.90887993	-25.45149424
5	43	1	70.00781593	-25.36119753
5	43	2	70.10675193	-25.36119753
5	43	3	70.10675193	-25.45149424
5	43	4	70.00781593	-25.45149424
5	44	1	70.10675193	-25.36119753

INDEX_Cluster	INDEX_Block	INDEX_Point	INDEX_LonDD	INDEX_LatDD
5	44	2	70.20568793	-25.36119753
5	44	3	70.20568793	-25.45149424
5	44	4	70.10675193	-25.45149424
5	46	1	69.71100793	-25.45149424
5	46	2	69.80994393	-25.45149424
5	46	3	69.80994393	-25.54179095
5	46	4	69.71100793	-25.54179095
5	47	1	69.80994393	-25.45149424
5	47	2	69.90887993	-25.45149424
5	47	3	69.90887993	-25.54179095
5	47	4	69.80994393	-25.54179095
5	48	1	69.90887993	-25.45149424
5	48	2	70.00781593	-25.45149424
5	48	3	70.00781593	-25.54179095
5	48	4	69.90887993	-25.54179095
5	49	1	70.05728393	-25.45149424
5	49	2	70.15621993	-25.45149424
5	49	3	70.15621993	-25.54179095
5	49	4	70.05728393	-25.54179095
6	53	1	70.10423242	-25.70700231
6	53	2	70.1672997	-25.77697927
6	53	3	70.08983823	-25.83398945
6	53	4	70.02676879	-25.76397598
6	55	1	70.17865213	-25.76862987
6	55	2	70.24171917	-25.83860656
6	55	3	70.16425784	-25.8956169
6	55	4	70.1011884	-25.82560343
7	60	1	70.78254285	-25.95570495
7	60	2	70.84561715	-26.02567726
7	60	3	70.76814866	-26.08269209
7	60	4	70.70507922	-26.01267863
7	61	1	70.88433246	-25.99716617
7	61	2	70.94749435	-26.06709616
7	61	3	70.87004658	-26.12415717
7	61	4	70.80689557	-26.05419296
7	62	1	70.98027809	-25.9606766
7	62	2	71.04347284	-26.03056281
7	62	3	70.96610518	-26.08766686
7	62	4	70.90292064	-26.01774616
7	63	1	70.94749435	-26.06709616

INDEX_Cluster	INDEX_Block	INDEX_Point	INDEX_LonDD	INDEX_LatDD
7	63	2	71.01073231	-26.13699357
7	63	3	70.93327384	-26.19408893
7	63	4	70.87004658	-26.12415717
7	64	1	71.04347284	-26.03056281
7	64	2	71.10674476	-26.10041584
7	64	3	71.02935966	-26.157559
7	64	4	70.96610518	-26.08766686
8	65	1	71.29631067	-26.02571558
8	65	2	71.35979782	-26.09540903
8	65	3	71.28255329	-26.1527208
8	65	4	71.21907531	-26.08299273
8	66	1	71.37254324	-26.08595712
8	66	2	71.4360304	-26.15565059
8	66	3	71.35878586	-26.21296235
8	66	4	71.29530788	-26.14323427
8	67	1	71.47280923	-26.05400645
8	67	2	71.53633309	-26.12365297
8	67	3	71.4591621	-26.18101388
8	67	4	71.39565425	-26.11132739
9	72	1	71.61486548	-26.34144368
9	72	2	71.67944795	-26.41039256
9	72	3	71.60285405	-26.46856772
9	72	4	71.53827876	-26.39958411
9	73	1	71.66541161	-26.42106788
9	73	2	71.73007484	-26.4899911
9	73	3	71.65346026	-26.54819532
9	73	4	71.58880371	-26.47923626
9	74	1	71.74194681	-26.36282939
9	74	2	71.80661139	-26.4317516
9	74	3	71.73007486	-26.48999169
9	74	4	71.66541161	-26.42106788
9	75	1	71.80661139	-26.4317516
9	75	2	71.87135924	-26.50060414
9	75	3	71.79481365	-26.55887586
9	75	4	71.73007486	-26.48999169
9	76	1	71.85307581	-26.51453559
9	76	2	71.91790078	-26.58336026
9	76	3	71.84132921	-26.64165779
9	76	4	71.77651465	-26.57280227
9	77	1	71.90363563	-26.59422902

INDEX_Cluster	INDEX_Block	INDEX_Point	INDEX_LonDD	INDEX_LatDD
9	77	2	71.96853841	-26.66302376
9	77	3	71.89195054	-26.7213549
9	77	4	71.82705368	-26.65252457
9	79	1	71.89501085	-26.24638701
9	79	2	71.95968048	-26.31527562
9	79	3	71.88314365	-26.37351474
9	79	4	71.8184766	-26.30462476
9	80	1	71.91491116	-26.349354
9	80	2	71.97952555	-26.41828465
9	80	3	71.90304462	-26.47648244
9	80	4	71.83839141	-26.40756934
9	81	1	71.97952555	-26.41828465
9	81	2	72.04425046	-26.48713123
9	81	3	71.96771429	-26.54537105
9	81	4	71.90304462	-26.47648244
10	85	1	72.30122697	-26.8437708
10	85	2	72.36561142	-26.91303418
10	85	3	72.28832484	-26.97076313
10	85	4	72.22396014	-26.9014776
10	86	1	72.32614911	-26.94252247
10	86	2	72.39065872	-27.01165243
10	86	3	72.31341616	-27.06949023
10	86	4	72.2488742	-27.0002826
11	91	1	72.78421091	-27.34463725
11	91	2	72.84927953	-27.41354225
11	91	3	72.7720483	-27.47163007
11	91	4	72.7069846	-27.40268785
11	92	1	72.69922505	-27.11446223
11	92	2	72.76409328	-27.18342835
11	92	3	72.68691279	-27.2414121
11	92	4	72.62209298	-27.17245595
11	93	1	72.76409328	-27.18342835
11	93	2	72.82904323	-27.2523552
11	93	3	72.75193619	-27.31039634
11	93	4	72.68691279	-27.2414121
11	94	1	72.82904323	-27.2523552
11	94	2	72.89409256	-27.32123017
11	94	3	72.81696397	-27.37932109
11	94	4	72.75193619	-27.31039634
12	95	1	73.83250015	-27.50682915

INDEX_Cluster	INDEX_Block	INDEX_Point	INDEX_LonDD	INDEX_LatDD
12	95	2	73.8982572	-27.57514983
12	95	3	73.82156598	-27.63376911
12	95	4	73.75581026	-27.56541109
12	96	1	73.75581026	-27.56541109
12	96	2	73.82156598	-27.63376911
12	96	3	73.74479318	-27.69235849
12	96	4	73.67903628	-27.62395992
12	98	1	73.82943914	-27.62776014
12	98	2	73.8952791	-27.69607211
12	98	3	73.81851418	-27.75470286
12	98	4	73.75267255	-27.68635015
12	99	1	73.90612172	-27.56913753
12	99	2	73.97196502	-27.63741444
12	99	3	73.8952791	-27.69607211
12	99	4	73.82943914	-27.62776014
12	100	1	73.90374727	-27.68960372
12	100	2	73.96967427	-27.75787176
12	100	3	73.89291527	-27.81654136
12	100	4	73.82698901	-27.74823526

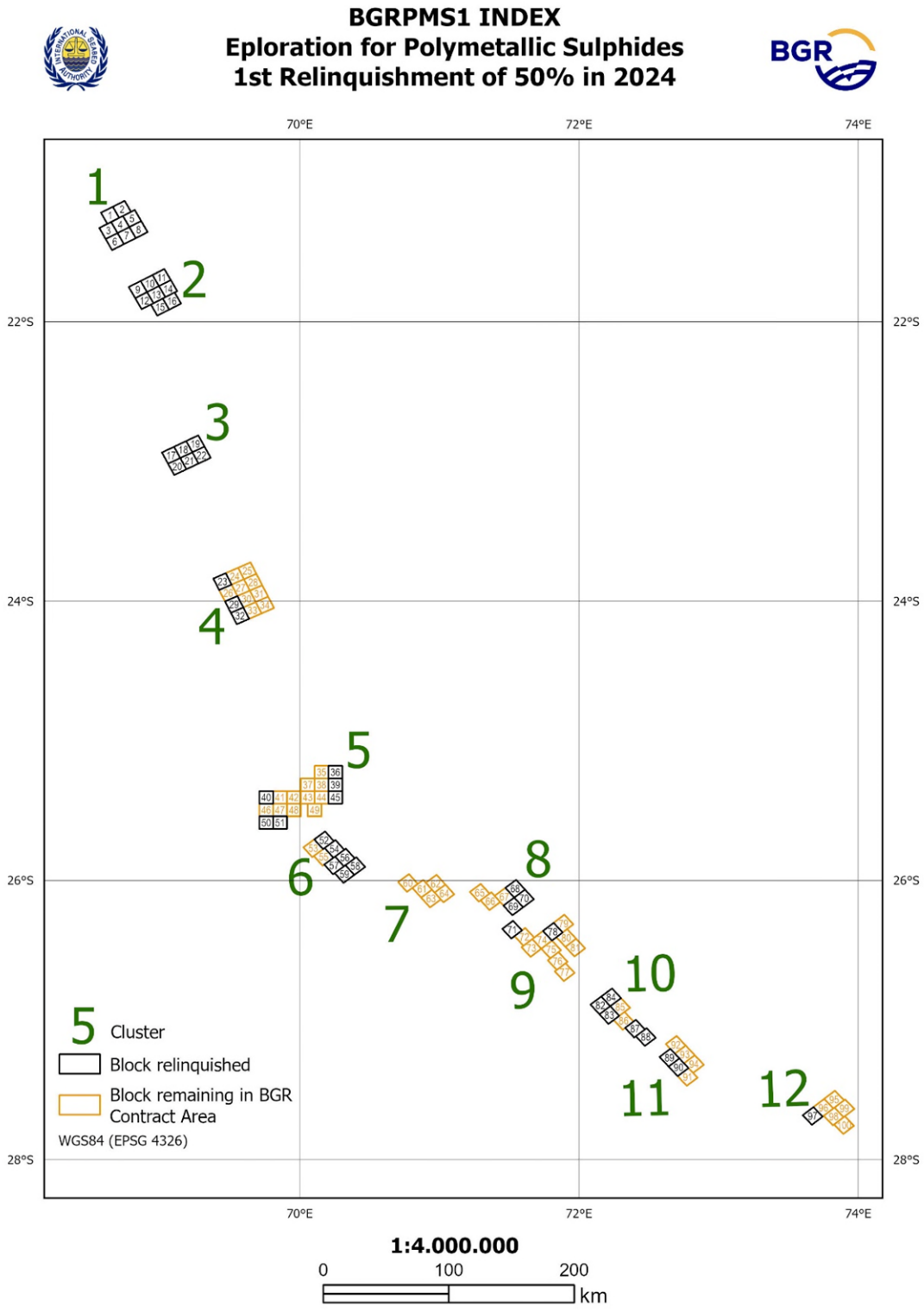

Figure 2: Relinquished blocks and blocks remaining with BGR in its contract area.

3. Plan of work

Summary of Plan of Work for Exploration for the first and the second 5-year periods (Regulation 18).

Year 1 (starting 05/2015)

- Preparation of bathymetric map of the license area
- Geological data processing
- Census on the marine biosphere, comparison of sites
- Studies on recent marine technological developments

Total costs for year 2015: 5,757,823 EUR

Year 2 (2016)

- Continuation of bathymetric mapping
- Geological data processing, petrogenetic and metallogenic
- Census on the marine biosphere, comparison of sites
- Submission of research cruise proposal I

Total costs for year 2016: 8,108,742 EUR

Year 3 (2017)

- Continuation of bathymetric mapping
- Geological data processing, genetic characterization
- Census on the marine biosphere, molecular data

Total costs for year 2017: 6,931,487 EUR

Year 4 (2018)

- Continuation of bathymetric mapping
- Geological data processing, integration of existing data
- Census on the marine biosphere, ongoing comparison
- Submission of research cruise proposal II

Total costs for year 2018: 9,506,132 EUR

Year 5 (2019)

- Continuation of bathymetric mapping
- Geological data processing, fluids
- Census on the marine biosphere, ongoing comparison

Total costs for year 2019: 8,645,942 EUR

Total costs for the 1st 5-year period: 38,950,126 EUR

Year 6 (2020)

- No exploration cruise in 2020 due to the Corona pandemic
- Continuation of analysis of geological, geophysical, and biological data from previous cruises
- New project structure for the high-res. bathymetric data collection
- Development of ROV-controlled drilling tool ROCS

Total costs for year 2020: 7.064.836 EUR

Year 7 (2021)

- Resume exploration field work with cruise INDEX 2021 (08 October – 31 December 2021)
- Geophysical mapping of the three-dimensional extent of sulphide deposits in the seabed
- First ROCS deployments: a drill rig that could selectively drill one-metre-long cores from an unmanned submersible (up to four cores per dive)
- Continuation of our environmental baseline studies including recovery and re-deployment of five sediment trap moorings and the census of marine biosphere
- Re-structuring of our ArcGIS project and upgrading to ArcGIS Pro
- Processing of massive sulphides to produce metal concentrates

Total costs for year 2021: 7.447.059 EUR

Year 8 (2022)

- Exploration cruise INDEX 2022 (06 October – 31 December 2022)
- Detection of two new hydrothermal fields (both mainly inactive)
- Continuation of geophysical work in selected hydrothermal fields to map the three-dimensional extent of sulphide deposits within the seafloor
- Continuation of the regional scale geological exploration and the development of deposit-scale geological maps as well as recovery of near-surface samples with a remotely operated vehicle in selected hydrothermal fields
- Continuation of environmental baseline studies with the sediment trap moorings and biological connectivity studies
- Analysis of geotechnical properties of massive sulphides for the development of mining technology

Total costs for year 2022: 10,352,667 EUR

Year 9 (2023)

- Exploration cruise INDEX 2023 (04 September – 20 November 2023)
- Continuation of geophysical investigations in selected hydrothermal fields to map 3d extent of sulphide deposits within the seafloor
- Continuation of the regional scale geological exploration and the development of deposit-scale geological maps as well as recovery of near-surface samples with a remotely operated vehicle in selected hydrothermal fields
- Second ROCS deployments: a drill rig that could selectively drill one-metre-long cores from an unmanned submersible (up to four cores per dive)
- First mineral resource assessments.
- Continuation of environmental baseline studies with the sediment trap moorings and biological connectivity studies

Total costs for year 2023: 8,550,152 EUR

Year 10 (2024)

- Exploration cruise INDEX 2024 (27 October – 20 December 2024)
- Continuation of geophysical investigations in selected hydrothermal fields to map 3d extent of sulphide deposits within the seafloor
- Application of an AUV for high-resolution bathymetric mapping of larger areas
- Intensified in-house geochemical and mineralogical analyses of massive sulphide samples
- Continuation of environmental baseline studies with the sediment trap moorings and biological connectivity studies
- Continuation of the flotation procedure for processing of massive sulphides
- Development of a new 5-years program

Total cost estimate for year 2024: 7,606,735 EUR

Total costs for the period 2020 – 2025: 41,021,449 EUR

Total costs for the period 2015 – 2025: 79,971,575 EUR

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 2015 – 2019

5-year Programme of Activities	First	Second	Third	Extension
General Objectives	**Objective**	**Description**		
	[List of the main objectives of the 5-year Programme of Activities]	[Description of the objective and related activities/factors/parameters]		
	Preparation of bathymetric maps	Following the cruise, the Contractor will compile bathymetric data for the preparation of reliable and detailed bathymetric maps and water column data of the exploration area; this process should integrate existing data from archives, published information, and newly-acquired, high-resolution swath bathymetry and geophysical data		
	Geological data processing	The Contractor will continue analytical measurements together with petrogenic and metallogenic characterization of rock, sulphide, sediment and fluid samples; this progress integrates existing data from former research and prospection cruises		
	Census of the marine biosphere	The Contractor will concentrate on the characterization of benthic communities. This includes the identification of species diversity, abundance and distribution of all Eukaryotic organisms present in the meiofaunal, macrofaunal and megafaunal size ranges. Ongoing comparison of communities from different sites will be complemented by molecular data for ecological and biogeographical characterization		

5-year Programme of Activities	First	Second	Third	Extension
General Objectives	**Objective**	**Description**		
	[List of the main objectives of the 5-year Programme of Activities]	[Description of the objective and related activities/factors/parameters]		
	Environmental baseline studies, part I: biogeochemistry and oceanography	We will apply so-called moorings with sediment traps, current meters and passive samplers which will be positioned in five different locations along the BGR license area and which will be deployed over several years. Based on samples and data from these moorings we will investigate the water masses present in the southern central Indian Ocean as well as the uptake of CO2 from the atmosphere into the water column and the ultimate fate of it by its incorporation into sinking particles. With this investigation we contribute to the global climate change research.		
	Studies on recent marine technological developments	As marine technology is undergoing changes due to computerization (remote control, automatization, use of autonomous vehicles etc.), studies should focus on the most recent marine technological developments which are of importance for the mining process		
	Submission of research cruise proposal I	The Contractor will prepare and submit a thematic proposal for a research cruise to the exploration area; this proposal will have to undergo a scientific review within Germany`s funding system. Main topics will be: (i) detailed sampling of ridge stratigraphy at oceanic core complexes; (ii) integration of petrological and metallogenic concepts; (iii) 3-D modeling of the		

5-year Programme of Activities	First	Second	Third	Extension
General Objectives	**Objective**	**Description**		
	[List of the main objectives of the 5-year Programme of Activities]	[Description of the objective and related activities/factors/parameters]		
		deeper oceanic lithosphere; and (iv) investigation of benthic communities (taxonomy, composition of assemblages and biodiversity) and their environment		
	Submission of research cruise proposal II	The Contractor will prepare and submit a thematic proposal for a research cruise to be conducted in the exploration area; this proposal will have to undergo a scientific review within Germany's funding system. Main topics will be: (i) detailed characterization and sampling of inactive vent fields; (ii) interaction of polymetallic sulphides with seawater and sediments with time; (iii) structural modeling of off-axis ridge geometry; and (iv) investigation of benthic communities (taxonomy, composition of assemblages and biodiversity) and their environment at inactive vent fields		

II. Agreed 5-year Programme of Activities 2020 – 2024

5-year Programme of Activities	First	Second	Third	Extension
General Objectives	**Objective**	**Description**		
	[List of the main objectives of the 5-year Programme of Activities]	[Description of the objective and related activities/factors/parameters]		
	Detection of new hydrothermal fields	After having covered the entire license area with vessel-based		

5-year Programme of Activities	First	Second	Third	Extension
General Objectives	**Objective**	**Description**		
	[List of the main objectives of the 5-year Programme of Activities]	[Description of the objective and related activities/factors/parameters]		
		bathymetric data (with a resolution of 40 m on the seafloor) it is a general objective to discover new hydrothermal fields which are both active and inactive		
	Developping geological deposit models	Based on the vessel-based bathymetric and backscatter data as well as video and photo data and samples from the seafloor models about the geological framework of already known hydrothermal fields will be developped.		
	Mineral Potential Mapping	Based on the deposit models mentioned above and based on geological maps of the seafloor an exersice will be carried out to select areas with an increased probability to contain hydrotherma fields. Multivariate statistical methods such as random forest and machine learning algorithms will be applied. Major goal is to detect inactive and/or extinct seafloor massive sulphide occurrences/deposits.		
	Investigation of the third dimension of SMS deposits	Seafloor massive sulphides are small but 3-dimensional bodies extending subseafloor. In order to carry out a resource assessment it is essential to have a good knowledge of the 3d dimensions of each massive sulphide body. We will realize this in a first step by systematic investigation of the subsurface of each hydrothermal site in the BGR license area applying high resolution		

5-year Programme of Activities	First	Second	Third	Extension
General Objectives	**Objective**	**Description**		
	[List of the main objectives of the 5-year Programme of Activities]	[Description of the objective and related activities/factors/parameters]		
		geophysical methods such as CSEM, self potential, and magnetics. We use deep-towed systems and tools placed on the seafloor to realize this. A second, necessary step for resource assessment is drilling. We will start this task with carrying out shallow ROV-based drills (ca. 1 m with ROCS). With this approach we can gather experience for drilling in the deep sea and we will get first subsurface samples for geochemical, mineralogical and geotechnical investigations.		
	Technological development	Technological developments will be realized for gathering large amounts of massive sulphide samples for the development of metallurgical extraction methods of metals from the ores. With respect to developing this technology we will cooperate with German companies investigating the possibility to use technology which will have a significant reduction concerning its footprint on the seafloor. With respect to metallurgy we will cooperate with research institutions to adapt best practise methods for the processing of the ore (i.e., the production of metal concentrates) before conventional metallurgical methods will be applied.		
	Environmental baseline studies, part I:	We will apply so-called moorings with sediment traps, current meters and passive samplers which		

5-year Programme of Activities	First	Second	Third	Extension
General Objectives	**Objective**	**Description**		
	[List of the main objectives of the 5-year Programme of Activities]	[Description of the objective and related activities/factors/parameters]		
	biogeochemistry and oceanography	will be positioned in five different locations along the BGR license area and which will be deployed over several years. Based on samples and data from these moorings we will investigate the water masses present in the southern central Indian Ocean as well as the uptake of CO2 from the atmosphere into the water column and the ultimate fate of it by its incorporation into sinking particles. With this investigation we contribute to the global climate change research.		
	Environmental baseline studies, part II: biological investigations of planktonic and benthic communities	We will investigate the biological inventory of the different hydrothermal fields including the mega-, macro- and meiobenthos as well as phyto- and zooplankton in the water column above them. Furthermore we will investigate the food webs within these ecosystems and the connectivity between them. These data will be a basis to estimate the impact of a possible SMS mining on the ecosystems.		
	Environmental baseline studies, part III: chemical oceanography	We will investigate the dissolved content of metals in the near-bottom seawater around hydrothermal vent sites. With this information we can later monitor the input of dissolved metals into this ecosystem by man-made mining.		

III. Results achieved during reported year 2015 - 2019

Annual objectives and activities			
Year	**No.**	**Agreed Objectives**	**Objective: Completed, Modified, Postponed or Replaced**
2015/ 2016	1	Preparation of bathymetric maps	Completed A bathymetric map of the entire contract area with a resolution of 40 m has been realized based on vessel-mounted echosounder data
2015-2020	2	Geological data processing	Partly completed This is a continuous process since new geological data will be gathered during each exploration cruise. Expenditure (Pos. 1+2): 19,488,068 EUR
2015-2020	3	Census of the marine biosphere	Partly completed This is a continuous process since new biological data will be gathered during each exploration cruise.
2015-2020	4	Environmental baseline studies: biogeochemistry and oceanography	Partly Completed Within the biogeochemical and oceanogrphic investigations several long mooring stations have been deployed including sediment traps, current meters and passive samplers. In addition CTD casts and water samples at the location of the moorings have been taken. The moorings will be recovered, data and samples downloaded, maintained and re-deployed every year. CTD casts will be repeated every year. Thus, these investigations are ongoing until the end of the contract. Expenditure (Pos 3+4): 19,126,600 EUR
2017	5	Studies on recent marine technological developments	Completed Studies on possible current mining technologies have been done together with the German company Bauer. A concept for the adaptation of Bauer's trench cutting technology for application in the deep-sea has been ddeveloped. Expenditure: 175,888 EUR

Annual objectives and activities			
Year	**No.**	**Agreed Objectives**	**Objective: Completed, Modified, Postponed or Replaced**
2017/ 2019	6	Submission of research cruise proposals	Completed Two proposals for using the German research vessel within the INDEX project has been successully submittted. These cruises took place in 2017 (cruise SO259) and 2019 (cruise SO271). Expenditure: 159,570 EUR

IV. Results achieved during reported year 2020 – 2024

Annual objectives and activities			
Year	**No.**	**Agreed Objectives**	**Objective: Completed, Modified, Postponed or Replaced**
2022-2023	1	Detection of new hydrothermal fields	Completed. Three new hydrothermal fields have been detected during the cruises in 2022 and 2023
2020-2024	2	Developing geological deposit models	Partly completed. Recently detected hydrothermal systems are still under exploration.
2020-2021	3	Mineral Potential Mapping	Completed. The analysis of the entire BGR contract area through mineral potential mapping was finished in 2021.
2020-2024	4	Investigation of the third dimension of SMS deposits	Partly Completed Geophysical exploration of the subsurface using CSEM, self potential and magnetics have been realized at seven hydrothermal fields. In one hydrothermal field the analysis of the geophysical data has been finalized in all other fields the analyses are ongoing. The ROV-mounted drilling system ROCS has been successfully used during two cruises with a total of 10 stations. Expenditure (Pos. 1-4): 17,372,099 EUR
2020	5	Technological development	Completed Development and testing of a Laser-assisted cutting and separation processes

Annual objectives and activities			
Year	**No.**	**Agreed Objectives**	**Objective: Completed, Modified, Postponed or Replaced**
			Expenditure: 67,166 EUR
2021	6	Technological development	Partly Completed Adaptation of raw ore processing technologies to the special characteristics of seafloor massive sulphides. Within this project within the INDEX project several classical processing technologies such as density and gravity sorting, electrostatic sorting and flotation were tested. In turned out that flotation ist the only useful method to produce metal concentrates from raw ores. Expenditure: included in Pos. 1-4
2024/ 2025	7	Technological development	Partly Completed Improvement of flotation technology for the processing of raw ore to produce metal concentrates. These metal concentrates are a saleable product. Expenditure: 100,610 EUR
2020-2024	8	Environmental baseline studies, part I: biogeochemistry and oceanography	Partly Completed Within the biogeochemical and oceanogrphic investigations several long mooring stations have been deployed including sediment traps, current meters and passive samplers. In addition CTD casts and water samples at the location of the moorings have been taken. The moorings will be recovered, data and samples downloaded, maintained and re-deployed every year. CTD casts will be repeated every year. Thus, these investigations are ongoing until the end of the contract.
2020-2024	9	Environmental baseline studies, part II: biological investigations of planktonic and benthic communities	Partly Completed Within the biological investigations selected species representative for the megafauna have been investigated for all known hydrothermal fields in the contract

Annual objectives and activities			
Year	**No.**	**Agreed Objectives**	**Objective: Completed, Modified, Postponed or Replaced**
			area. Selected species representative for the macrofauna have been invetsigated from four hydrothermal fields and for the meiofauna from seven hydrothermal fields. Metarbarcoding and eDNA are still to realize. Plankton speices were investigated from 8 hydrothermal fields so far.
2023-2024	10	Environmental baseline studies, part III: chemical oceanography	Partly Completed Passive sampler were deployed to measure the time-integrated bioavailable fraction of dissolved metals in the water column and in the near-bottom seawater in clusters 1, 10 and 12. Metals such as Cd, Co, Cu, Fe, Mn, Ni, Pb, Zn, Sc, and the rare eart elements were measured. Expenditure (Pos. 8-10): 14,822,803 EUR

5. Training Programme

Schedule 3 of Annex III of the Regulations.

I. Training Programme

Type of training	Home lab training	Onboard training
Institutions	BGR/GEOMAR/DZMB	BGR
Duration	6 weeks	4-6 weeks
Scope	Post-cruise work on samples and data	Routine work onboard the vessel
Fields	Geochemical, mineralogical, microbiological and geophysical analysis of data and samples, processing of bathymeric data, environmental aspects of deep sea mining.	Pre-cruise preparation, vessel navigation, survey planning and selection of sampling sites, introduction to marine sampling tools and techniques
Qualification required	Bachelor degree in geology or geophysics	Bachelor degree in geology or geophysics
Financing	Financed by BGR	Financed by BGR

II. Trainings conducted up to reported year 2024

Start year	End Year	Name of Trainee	Nationality	Gender	Type of Programme	Details	Duration
2015	2017	Javier Ignacio PERONI	Argentinia	male	on-board and post-cruise training	on-board 2015, post cruise 2017	6 weeks at-sea training, 6 weeks post-cruise training
2015	2017	Unyime Udoudo UMOH	Nigeria	male	on-board and post-cruise training	on-board 2015, post cruise 2017	6 weeks at-sea training, 6 weeks post-cruise training
2016	2018	Mohamed Aly Elsayed Aly HASSAN	Egypt	male	on-board and post-cruise training	on-board 2016, post cruise 2018	6 weeks at-sea training, 6 weeks post-cruise training

Start year	End Year	Name of Trainee	Nationality	Gender	Type of Programme	Details	Duration
2016	2017	Helen WONG PEI SAN	Singapore	female	on-board and post-cruise training	on-board 2016, post cruise 2017	6 weeks at-sea training, 6 weeks post-cruise training
2016	2017	Emmanuel QUAYSON	Ghana	male	on-board and post-cruise training	on-board 2016, post cruise 2017	6 weeks at-sea training, 6 weeks post-cruise training
2016	2017	Yanina BERBEGLIA	Argentinia	female	on-board and post-cruise training	on-board 2016, post cruise 2017	6 weeks at-sea training, 6 weeks post-cruise training
2017	2019	Eric Kwesi ARTHUR-MENSAH	Ghana	male	on-board and post-cruise training	on-board 2017, post cruise 2019	6 weeks at-sea training, 6 weeks post-cruise training
2017	2018	Thomas Edward Takai WHIDDON	New Zealand - Cook Islands	male	on-board and post-cruise training	on-board 2017, post cruise 2018	6 weeks at-sea training, 6 weeks post-cruise training
2017	2018	Sumran PRAPHAT	Thailand	male	on-board and post-cruise training	on-board 2017, post cruise 2018	6 weeks at-sea training, 6 weeks post-cruise training
2017	2019	Alyaa Aly Mohamed Abdelsalam ZIDAN	Egypt	female	on-board training	on-board 2017, post cruise postponed due to visa issues	6 weeks at-sea training

Start year	End Year	Name of Trainee	Nationality	Gender	Type of Programme	Details	Duration
2021	2022	Dr. Prithivi Dass Bissessur	Mauritius	male	on-board training and 6-weeks visit at BGR facilities in Germany	On-board during INDEX2021 / Leg 1, post-cruise in 2022	4 weeks at sea, 6 weeks post cruise training in Germany
2021	2022	Dr. Jensen Jacob	India	Male	on-board training	On-board during INDEX2021 / Leg 1, post-cruise training cancelled because Dr. Jacob did not get permission from his employer to come to Germany	4 weeks at sea
2023	2024	Chelsi Grace Mendoza	Philippines	female	on-board training and post-cruise training at BGR facilities in Germany	On-board during INDEX2023 / Leg 2, post-cruise in 2024	6 weeks at sea, 4 weeks post-cruise
2023	2024	Kristine Joy Motol	Philippines	female	on-board training and post-cruise training at BGR facilities in Germany	On-board during INDEX2023 / Leg 2, post-cruise in 2024	6 weeks at sea, 4 weeks post-cruise

Start year	End Year	Name of Trainee	Nationality	Gender	Type of Programme	Details	Duration
2023	2024	Alessandra Rivero Cortés	Bolivia	female	on-board training and post-cruise training at BGR facilities in Germany	On-board during INDEX2023 / Leg 2, post-cruise in 2024	6 weeks at sea, 4 weeks post-cruise
2023	2024	Georges Kasay	DR Congo	male	on-board training	On-board during INDEX2023 / Leg 2	6 weeks at sea
2023	2024	Faye Anne De Leon	Philippines	female	on-board training and post-cruise training at BGR facilities in Germany	On-board during INDEX2023 / Leg 1, post-cruise in 2024	3 weeks at sea, 4 weeks post-cruise
2023	2024	Elisha Jane Maglalang	Philippines	female	on-board training and post-cruise training at BGR facilities in Germany	On-board during INDEX2023 / Leg 1, post-cruise in 2024	3 weeks at sea, 4 weeks post-cruise
2024	2025	Feo Mahasoa Rasamiano harana	Madagascar	female	on-board training and post-cruise training at BGR facilities in Germany	On-board during INDEX2024 / Leg 1, post-cruise in 2024	3 weeks at sea, 4 weeks post-cruise
2024	2025	John Savio Jose	India	male	on-board training and post-cruise	On-board during INDEX2024 / Leg 1,	3 weeks at sea, 4 weeks post-cruise

Start year	End Year	Name of Trainee	Nationality	Gender	Type of Programme	Details	Duration
					training at BGR facilities in Germany	post-cruise in 2024	

III. Completed Trainings per Year

	Onboard and home lab training
Year 1 (2015)	
Year 2 (2016)	
Year 3 (2017)	5
Year 4 (2018)	3
Year 5 (2019)	2
Year 6 (2020)	
Year 7 (2021)	2
Year 8 (2022)	
Year 9 (2023)	6
Year 10 (2024)	2

6. Standard clauses

Annex IV of the Regulations.