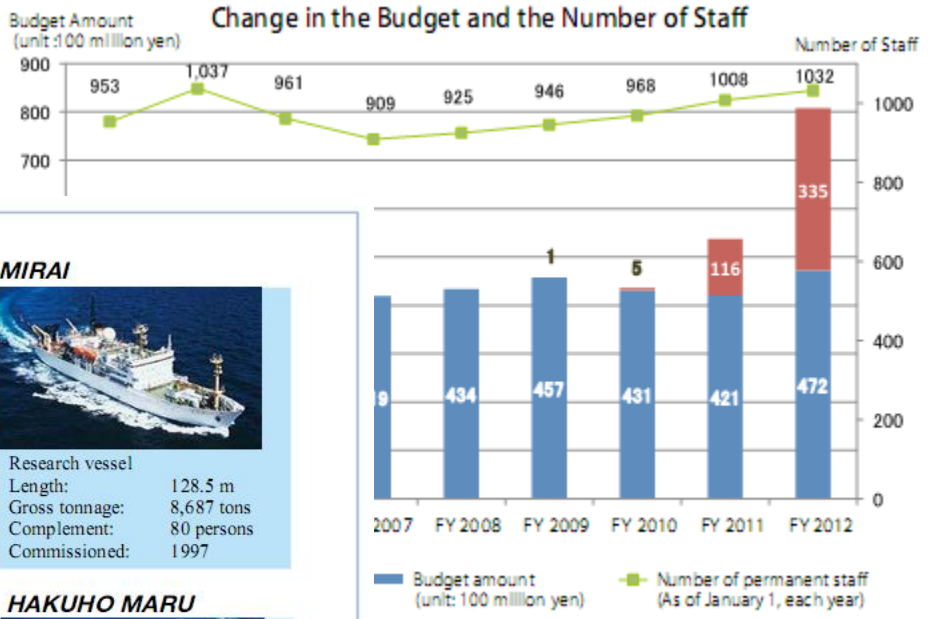
JAMSTEC-Япония
Japan Agency for Marine-Earth Science and Technology



Vessels

CHIKYU

Deep-sea drilling vessel
Length: 210 m
Beam: 38 m
Height from hull: 130 m
Complement: 200 persons
Gross tonnage: 56,752 tons
Maximum drilling depth: 2,500 m
Length of drill strings: 10,000 m
Commissioned: 2005

MIRAI

Research vessel
Length: 128.5 m
Gross tonnage: 8,687 tons
Complement: 80 persons
Commissioned: 1997

KAIREI

Deep Sea research vessel
Length: 106.0 m
Gross tonnage: 4,517 tons
Complement: 60 persons
Commissioned: 1997

YOKOSUKA

Support vessel
Length: 105.2 m
Gross tonnage: 4,439 tons
Complement: 60 persons
Commissioned: 1990

HAKUHO MARU

Research vessel
Length: 100.0
Gross tonnage: 3,991
Complement: 89 per
Commissioned: 1989

KAIYO

Research vessel
Length: 61.5 m
Gross tonnage: 3,350 tons
Complement: 60 persons
Commissioned: 1985

NATSUSHIMA

Research vessel
Length: 67.3m
Gross tonnage: 1,739 tons
Complement: 55 persons
Commissioned: 1981

TANSEI MARU

Research vessel
Length: 51.0
Gross tonnage: 610 tons
Complement: 38 persons
Commissioned: 1982

(※The retired in January 2013)

Training pool

Hyperbaric chamber

Ultrasonic tank

Core Repository

Figure 2. New heavy work-type of ROV for exploration of seafloor mineral resources

HYPER DOLPHIN

3,000 m Class Remotely operated vehicle

Depth capability:	3,000 m
Length:	3.0 m
Dry weight:	3.8 tons

KAIKO 7000 II

7,000 m Class Remotely operated vehicle

Depth capability:	(launcher) 11,000 m
	(vehicle) 7,000 m
Length / dry weight:	(launcher) 5.2 m/5.8 tons
	(vehicle) 3.0 m/3.9 tons

Figure 5. Cross section of a ferromanganese crust collected at the Takuyo Daigo Seamount

SHINKAI 6500

Manned research submersible

Depth capability:	6,500 m
Complement:	3 persons
Length:	9.5 m
Dry weight:	26.7 tons

DEEP TOW

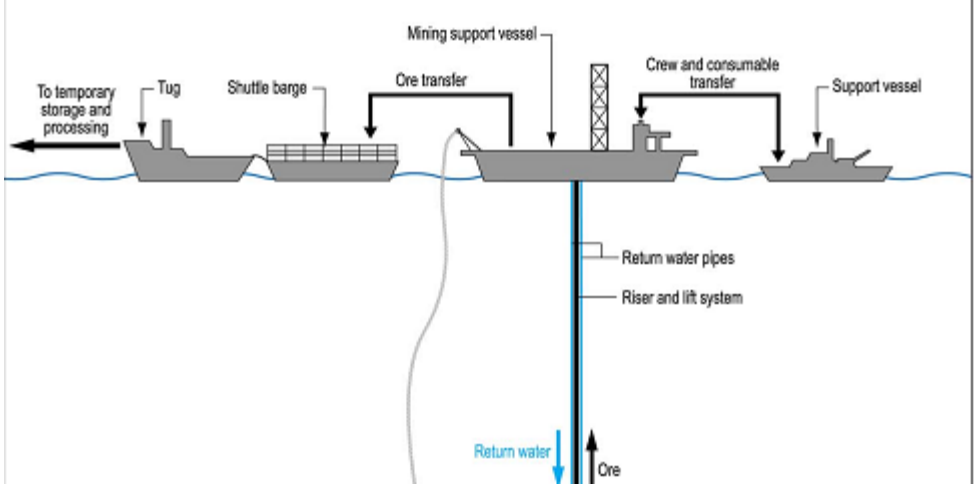
Deep ocean floor survey system

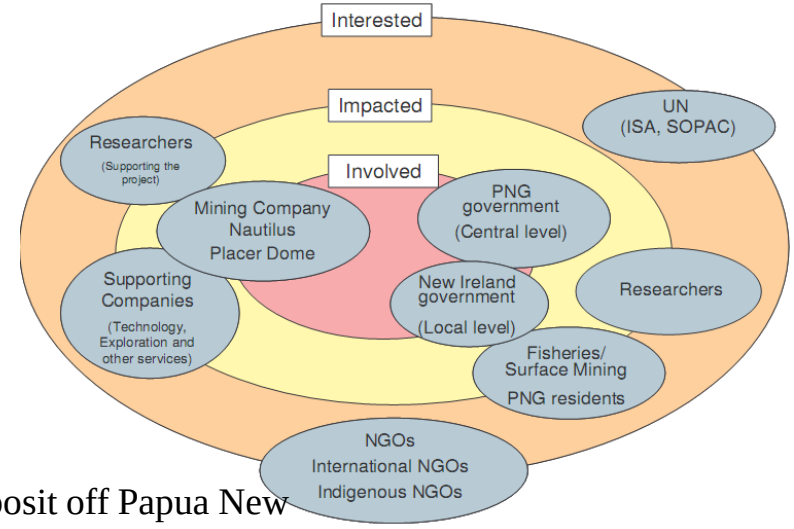
Depth capability:	4,000 m – 6,000 m
Length:	approx. 3.5 m
Dry weight:	approx. 1.0 ton

JOIDES Resolution Vessel from the Ocean Drilling Program, and the SEVAN Driller from Petrobras. (Adopted from: www-odp.tamu.edu, www.dynamicpositioningnews.com)

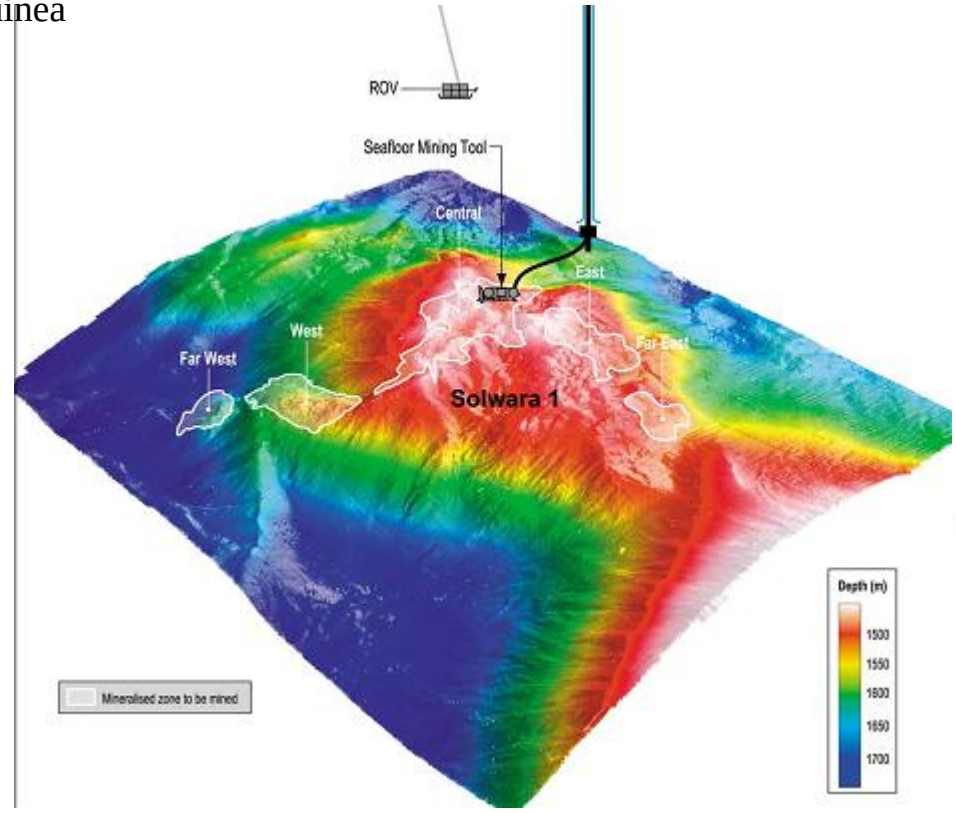
Table 4-2: Dynamic Positioned Drilling Rigs with Deep Water Capability (Greenberg 2010)

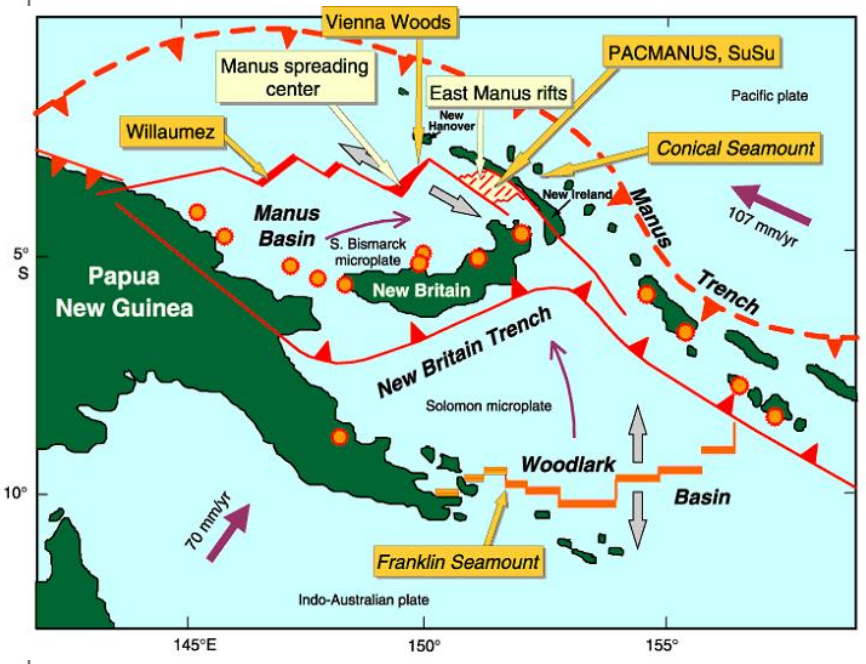
Vessel Name	Maximum Water Depth Equipped	Maximum Water Depth Certified
Noble Danny Adkins	12 000ft (3 657.6m)	12,000ft (3 657.6m)
Noble Jim Day	12 000ft (3 657.6m)	12,000ft (3 657.6m)
Sevan Driller	12 500ft (3 810m)	12,500ft (3 810m)
Discoverer Clear Leader	10 000ft (3 048m)	12,000ft (3 657.6m)
Discoverer Americas	10 000ft (3 048m)	12,000ft (3 657.6m)
Discoverer Inspiration	10 000ft (3 048m)	12,000ft (3 657.6m)
Petrobras 10000	10 000ft (3 048m)	12,000ft (3 657.6m)
Dhirubhai Deepwater Kg1	10 000ft (3 048m)	12,000ft (3 657.6m)
Dhirubhai Deepwater Kg2	12 000ft (3 657.6m)	12,000ft (3 657.6m)
Discoverer Luanda	7 500ft (2 286m)	12,000ft (3 657.6m)





Schematic of SMS mining technology and plan for the Solwara 1 deposit off Papua New Guinea





Vienna Woods (Australian Government, Geoscience Australia)

Оборудование и методики разведки VMS руд

Прямые поиски

Дистанционные

Figure 10: The Southampton Oceanography Centre's deep-tow sidescan sonar instrument TOBI being prepared for launch from the RRS Charles Darwin at the Mid-Atlantic Ridge

Figure 11: The Southampton Oceanography Centre's deep-tow hydrothermal plume instrument BRIDGET being prepared for launch from the RRS Charles Darwin at the Mid-Atlantic Ridge

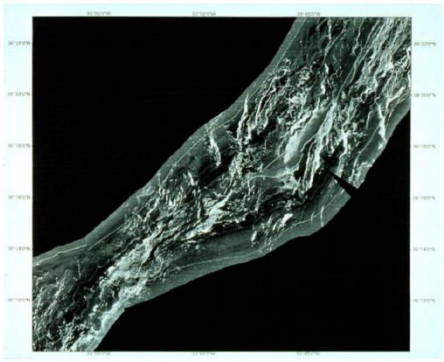
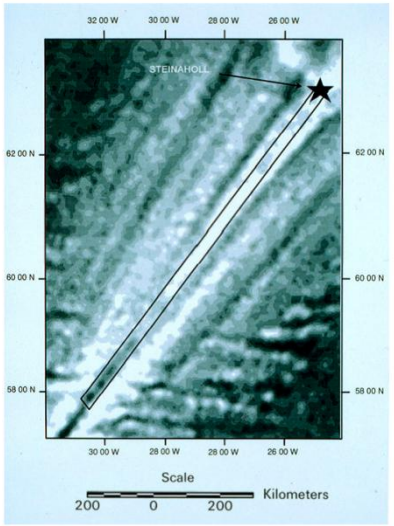


Figure 13: TOBI sidescan sonar image of the highly tectonic non-transform discontinuity which offsets two adjacent segment centres on the Mid-Atlantic Ridge and hosts the pronounced Rainbow massive sulphides hydrothermal deposit at approximately 36 degrees North, near the Azores Triple Junction.

Table 1: Selected Research Programmes for Seafloor Massive Sulphides Deposits 1980-2000

Program	Countries	Ocean Area
FAMOUS	France/USA	Mid-Atlantic
TAG	USA/France	Mid-Atlantic Ridge, 26°N
FARA	France/USA	Mid-Atlantic Ridge, Azores
DIVA	France/USA	Mid-Atlantic Ridge, Azores
BRIDGE	United Kingdom	Mid-Atlantic Ridge
CYAMEX	France/USA	East Pacific Rise, 21°N
GEOMETEP	Germany	East Pacific Rise, South
GARIMAS	Germany	Galapagos Rift, 86°W
HYDROTRACE	Germany/Canada	Juan de Fuca Ridge, Axial Seamount
VENTS	USA/Canada	Juan de Fuca Ridge
GEMINO	Germany	Central Indian Ridge
HIFIFLUX	Germany	Southwest Pacific, North Fiji Basin
STARMER	France/Japan	Southwest Pacific, North Fiji Basin
PACMANUS	Australia/Canada	Southwest Pacific, Manus Basin
PACLARK	Australia/Canada	Southwest Pacific, Woodlark Basin
NAUTILAU	France/Germany	Southwest Pacific, Lau Basin
EDISON	Germany/Canada	Southwest Pacific, Tabar-Feni Arc



Distributions of hydrothermal activity detected along the Reykjanes Ridge superimposed upon the pseudo-bathymetry derived from satellite altimetry by Sandwell & Smith [29].

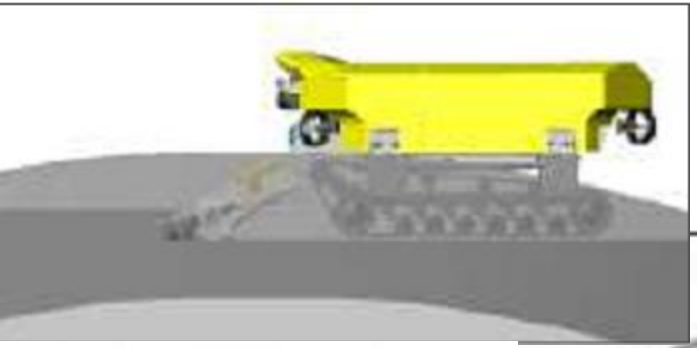
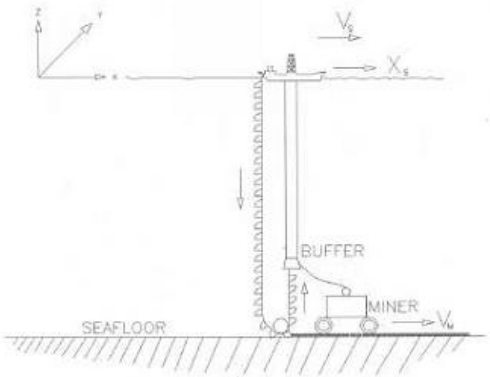
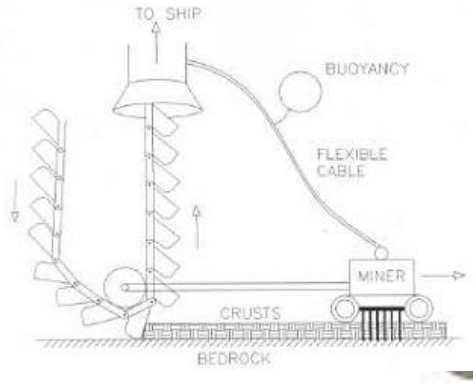


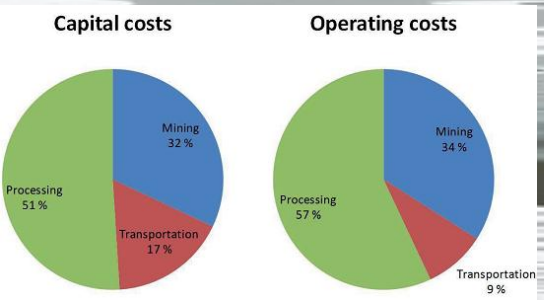
Figure 3-4: Coal mining drum cutter



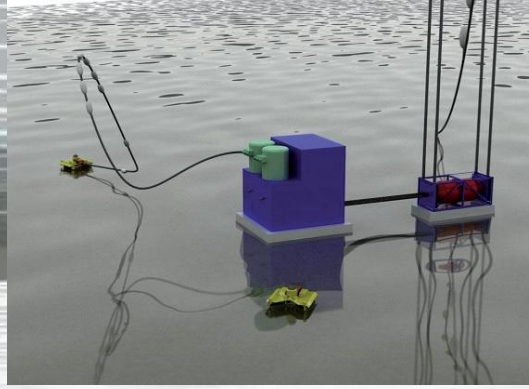


Nautilus has investigated the use of proven subsea technology for mining the SMS deposits. This 900HP ROV oil/gas pipelay trenching machine is as powerful as a D11 bulldozer.

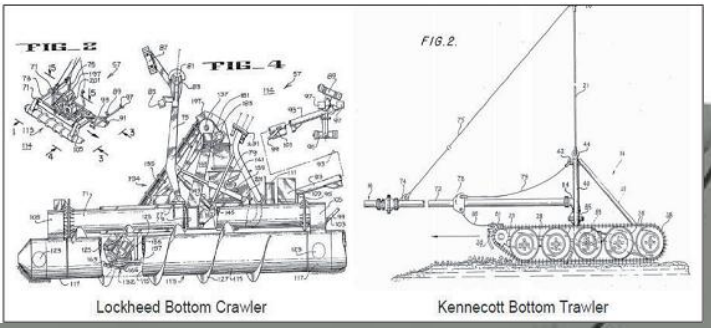
Fig. 5 A crust Mining System—hybrid mining systems: (a) continuous line bucket (CLB) system through pipe; (b) combined CLB and hydraulic system (Chung, 1994)



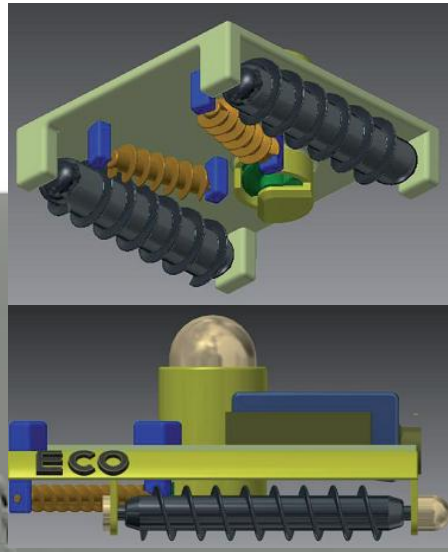
Major costs for a marine mining venture, (Graham and Trotman, 1989).

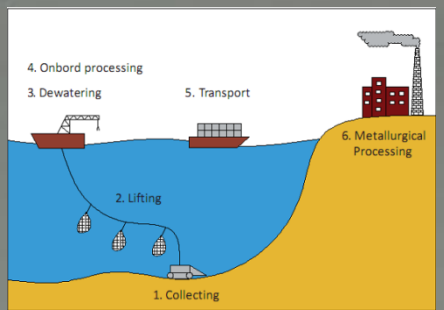


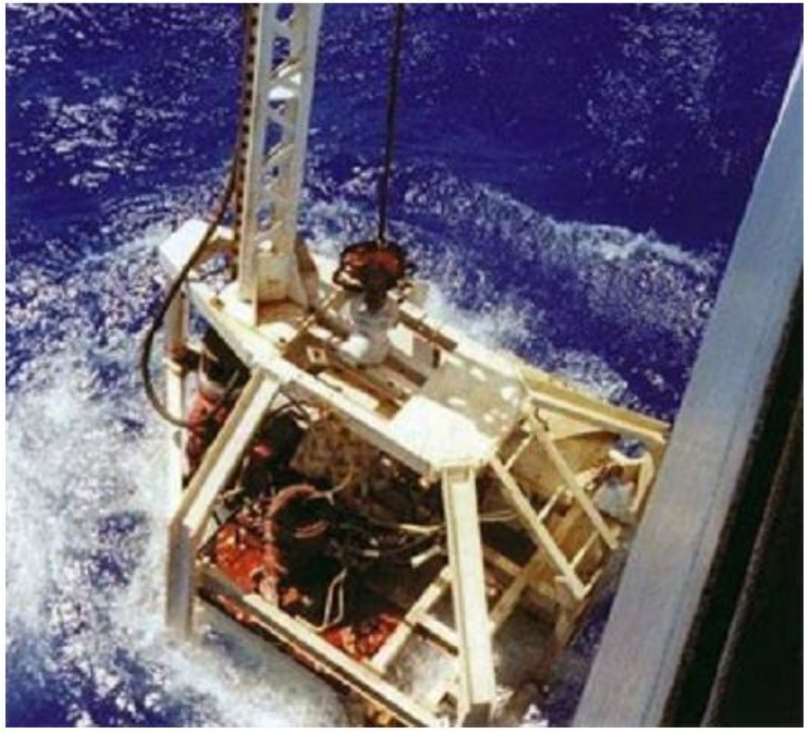
Английская концепция разработки ЖМК на океаническом дне (Lloyd's Register Educational Trust)



Two different designs for nodule collectors as presented by Morgan. The Lockheed bottom Crawler is a self-propelled screw-based design (patented in 2011) whereas the Kennecott Bottom Trawler is a dragged track-based design.

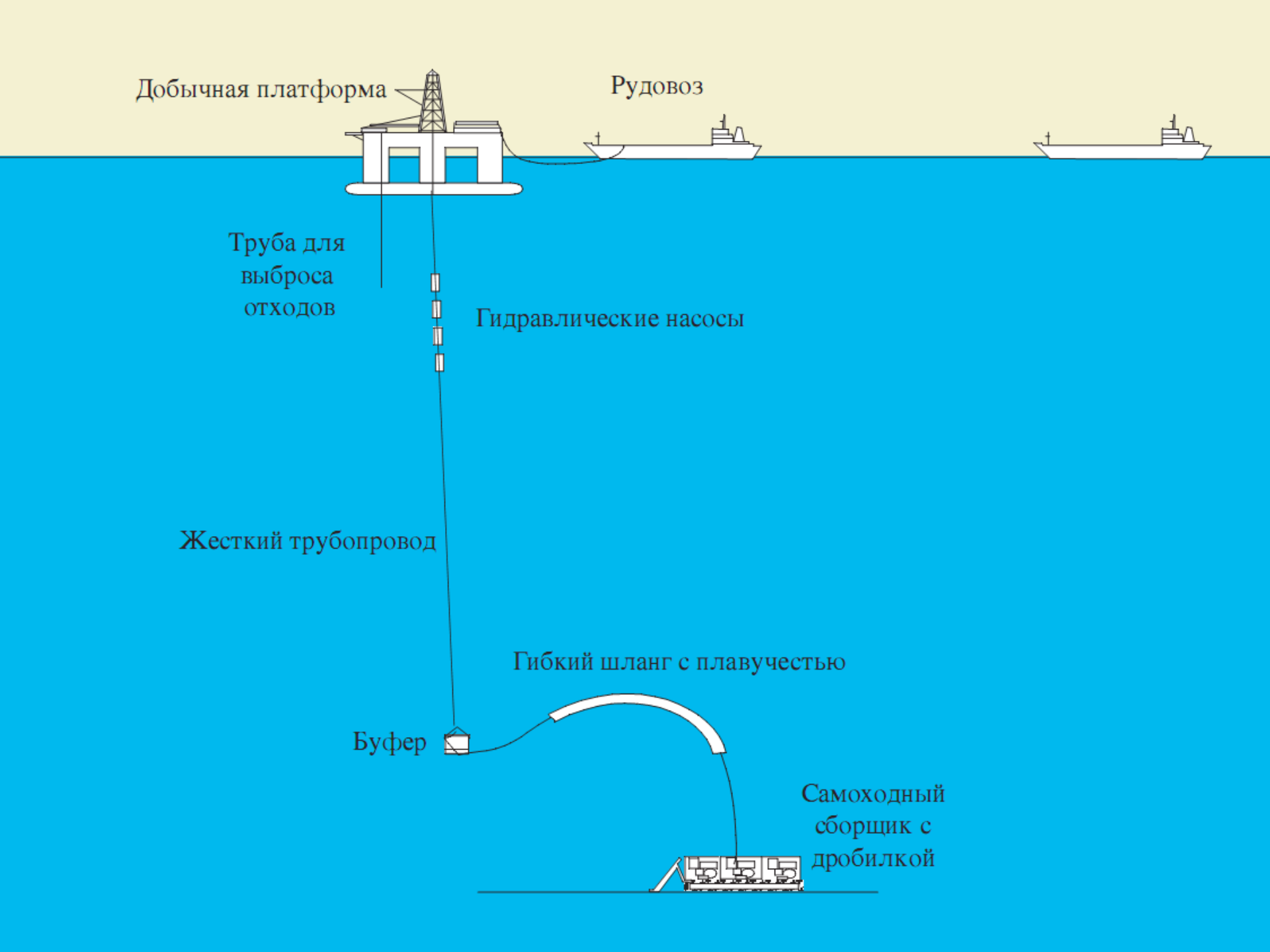






Разработка ТК-15 является этапом предваряющим создание буровых установок, рассчитанных на отбор кернов с глубин до 30м от уровня дна. Глубоководная буровая установка, диаметр бурения 112 мм, глубина бурения до 6 м, дифференциальная подача. Опробована в рейсе НИС "Профессор Логачев". Изготовлена для отбора кернов пород 5-12 категории по буримости на глубину до 6 м ниже уровня дна

АМК «Рифт-3»используется в двух модификациях, соответственно решаемым геологическим задачам:
Первая модификация - задача выявления и картирования рудных тел ГПС); обеспечивает в режиме придонного профилирования регистрацию естественного электрического поля (ЕП) и выявление зон изменения показателей водорода (pH), серы (pS), натрия (pNa), окислительно-восстановительного потенциала (Eh).
Вторая модификация - определение мощности рудных тел; обеспечивает вертикальные электрические зондирования (ВЭЗ) вдоль профиля.
Глубинность исследования до 40м.


Добычная платформа
Рудовоз
Труба для выброса отходов
Гидравлические насосы
Жесткий трубопровод
Гибкий шланг с плавучестью
Буфер
Самоходный сборщик с дробилкой

"Когда-то добыча нефти на шельфе казалась нереальной, однако в исторически короткие сроки именно добыча на шельфе сделала Норвегию ведущей нефтяной державой. Поэтому с фундаментальной точки зрения рано или поздно придется начинать освоение залежей металлических полезных ископаемых на больших глубинах. Если запасы и содержания окажутся большими, то отработка будет рентабельной и на больших глубинах» гл. геолог Глеб Моралев.