CODE FOR ENVIRONMENTAL MANAGEMENT OF MARINE MINING

Originally Adopted by the
INTERNATIONAL MARINE MINERALS SOCIETY
ON 2 NOVEMBER 2001
REVISED VERSION ADOPTED 16 SEPTEMBER 2011

Introduction

The Code: Its Content and Format. The Code consists of a statement of Environmental Principles for marine mining, followed by a set of Operating Guidelines for application as appropriate at specific mining sites. These Guidelines are designed to serve industry, regulatory agencies, scientists and other stakeholders, as benchmarks for development, implementation and assessment of environmental management plans and as advice on best fit-for-purpose practices at sites targeted for marine minerals research, exploration and extraction. The Principles and Guidelines set broad directions in a context of shared values rather than prescribing specific practices. It is important to note that this is a VOLUNTARY code which marine mineral companies/entities/other stakeholders are encouraged to strive towards and use.

Initiative for the Code. The International Marine Minerals Society approved development of this Code at its Annual General Meeting in January 2000, following a proposal made at the 2000 Underwater Mining Institute (UMI 2000) by Julian Malnic, founder and first Chief Executive Officer (CEO) of Nautilus Minerals Corporation (PNG).

Development of the Code. The Code draws on other marine mining environmental statements, guidelines, policies, and codes issued by industry, governments, intergovernmental and non-governmental organizations, as well as on the experience of industry personnel, marine scientists, marine environmental scientists, engineers and lawyers. The Code takes into account and endeavors to comply with and implement international legal obligations relating to the protection and preservation of the marine environment with regard

to marine mining activities, including mining of mineral resources at or beneath the seabed, such as those established by and in accordance with the 1982 United Nations Convention on the Law of the Sea (LOSC) and the 1994 Agreement implementing LOSC Part XI, the relevant Conventions for safe and environmentally responsible shipping promulgated under the auspices of the International Maritime Organization, and the London Convention and Protocol on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter.

Appendix 1 lists the principal published sources and Appendix 2 lists individuals who offered comments on the current revision in their personal capacity, and provides examples of the wealth of practical experience employed in the development and revision of the Code.

Who Will be Served by the Code? The Code will serve mining companies/entities[1] with an interest or activity in marine mining, governments, local communities and stakeholders, intergovernmental and non-governmental organizations, scientists, and other groups with an interest in or affected by marine mining research, exploration and/or activities.

How Will the Code Function? The Code provides a framework and benchmarks for development and implementation of an environmental program for marine minerals research, exploration and extraction by marine mining companies/entities at their operations. It also provides a framework and benchmarks for local communities and other stakeholders, governments, and intergovernmental and non-governmental organizations to assess proposed and actual applications of best fit-for-purpose environmental practices at marine mining sites. The Code seeks to complement applicable binding national and international regulations for the protection of the marine environment with regard to marine mining where these regulations exist. The Code also seeks to provide environmental principles and guidelines where these are absent or could be improved upon, within the scope of the Principles outlined in the Code. Where the Code sets higher standards than those legally required, companies/entities are encouraged to follow the Code and strive to improve the legally binding requirements accordingly. The Code is ***voluntary*** and any company/entity and/or stakeholders is/are eligible to strive towards, adopt or use it. IMMS membership is not required.

Reporting. As well as complying with any applicable national and international requirements, companies/entities adopting the Code commit themselves to provide transparency in their environmental activities by regular reporting of environmental planning, monitoring, assessment and other actions relating to protecting and preserving the marine environment. These reports will demonstrate the company/entity's commitment to, and implementation of, the Code, will describe the company/entity's performance in relation to the Principles and Operating Guidelines, and will be made public. Companies/entities and stakeholders adopting or using the Code or following its Principles and Operating Guidelines are encouraged to publicize this.

Benchmarking. The Operating Guidelines provide benchmarks by which a mining company/entity can set its environmental program for a marine exploration or extraction site.

[1] 'Mining companies/entities' include all public (e.g., wholly or partly state-owned and/or operated by or with an intergovernmental organization or agency) and private, commercial, non-profit/non-commercial, and scientific research groups and enterprises engaged in all marine mining and minerals-related activities.

Site stakeholders, including government agencies, intergovernmental and non-governmental organizations, scientists and local communities can also use the Guidelines as benchmarks for checking the company/entity's environmental management plans and their implementation.

Implementation and Feedback. Companies/entities and stakeholders adopting or using the Code are encouraged to inform the IMMS of the effectiveness of the Code, including any problems and corrective action taken/required in implementing it. For this purpose an 'Implementation and Feedback Form' is provided in Annex 1. This will assist IMMS in keeping track of companies/entities/stakeholders adopting or using the Code and in obtaining yearly feedback from them, to assess the success of the Code in achieving its objectives and to facilitate further revisions of the Code to better meet its goals. IMMS will compile and circulate the received Feedback Forms to the IMMS membership and to the International Seabed Authority, as per its request, prior to each meeting of the Underwater Mining Institute.

Code Review. The Code is intended to be a living, adaptive document, responsive to, e.g., experience with its implementation, improvements in best fit-for-purpose environmental practices, technological developments, and changes in applicable regulations. The Code will be reviewed by IMMS every five years, after consultation with the marine mining industry and other stakeholders in marine mining operations.

Principles

Marine mining companies/entities adopting this Environmental Code commit themselves to the following principles:

- To observe the laws and policies and respect the aspirations of sovereign states and their regional sub-divisions, and of international law, as appropriate to underwater mineral developments.
- To apply best practical and fit-for-purpose procedures for environmental and resource protection, considering future activities and developments within the area that might be affected.
- To consider environmental implications and observe the precautionary approach, from initiating a project through all stages from exploration through development and operations, including waste disposal, to eventual closure, and post-closure monitoring.
- To consult with stakeholders and facilitate community partnerships on environmental matters throughout the project's life cycle.
- To maintain an environmental quality review program and deliver on commitments.
- To report publicly on environmental performance and implementation of the Code.

Operating Guidelines

Responsible and Sustainable Development. Manage activities in a manner consistent with environmentally, economically and socially responsible and sustainable development of the operating area, such that environmental, economic and social considerations are integrated into planning, decision-making and management on an equal footing.

1. Pursue environmentally responsible operations through innovations in technology and equipment, improvements in operational, natural resource, equipment and energy use efficiencies, as well as in prevention, minimization and recycling of emissions and wastes and minimization of noise, in scientific and engineering research, in environmental monitoring and in providing regular information and feedback to management, relevant government agencies and affected stakeholders, including non-governmental organizations.
2. Reduce the possible environmental impacts of mine-related waste in a manner that is consistent with the Principles of the Code and that will facilitate future environmentally and socially responsible use of the area (both seabed and water column).
3. Minimize the impacts of mining operations on and maintain long-term ecosystem health, functions and services affected by mining operations, and protect cultural heritage, knowledge and values of the marine environment, including designated marine protected areas and reserves.
4. Re-use and recycle mineral products and by-products, where possible, to maximize their utility and enhance availability of mineral resources to current and future generations.
5. Improve knowledge of the properties, short- and long-term availability and use of marine mineral resources and their related ecological and environmental effects, including development and use of methods to quantify and integrate the valuation, preservation of value and enhancement of value of ecosystem services adjacent and/or related to the resource to be developed.
6. Encourage customers, business partners, contractors and suppliers of equipment, goods and services to adopt environmentally responsible and sustainable development principles and practices.
7. Consider *biological* resource potential and value of living organisms at potential marine mining sites as well as the *mineral* resource potential and value.

Environmentally Responsible Company/Entity Ethic. Develop an environmentally responsible company/entity ethic by showing management commitment, implementing environmental management systems, and providing time and resources to demonstrate requirements of the environmental ethic to employees, contractors and suppliers of equipment, goods and services.

1. Develop, implement and communicate an environmental policy consistent with the Code.
2. Demonstrate management commitment through application of environmental management practices consistent with the Code.
3. Inform employees, contractors and suppliers of equipment, goods and services about and require compliance with company/entity policies, goals, guidelines and practices for environmental, socio-economic and heritage protection.
4. Implement environmental education and training programs for employees, and, if appropriate and feasible, contractors.

5. Facilitate and engage in community and other stakeholder education about company/entity environmental principles and their application at the area of operations.

Community Partnership. Consult affected communities on their concerns, aspirations and values regarding development and operation of marine mining projects, recognizing that environmental, socio-economic, cultural and scientific research values and interests are linked.

1. Identify directly and indirectly affected stakeholders, including the marine scientific research community, and their concerns.
2. Encourage openness and dialogue with employees, marine research scientists and the regional community, including indigenous peoples, ensure equitable and culturally appropriate engagement, promote cross-cultural awareness, and specifically address concerns about environmental, social and scientific research impacts.
3. Provide to the community non-proprietary technical information about potential effects and duration of operations, of waste products and their management, of rehabilitation procedures, and of socio-economic benefits and costs.
4. Establish community consultation prior to each stage of operations, be prepared to modify project plans and practices according to the consultations, develop and maintain appropriate community consultation through all stages of exploration, extraction, waste disposal and closure, including, where appropriate and feasible, inviting a community observer to visit and a marine research scientist to join a marine mining vessel.

Environmental Risk Management. Use appropriate risk management strategies and the precautionary approach to guide exploration, extraction, waste disposal and closure, and to identify environmental risks, their possible consequences, and their probabilities of occurrence, including but not limited to the following:

1. Conduct and utilize environmental baseline and monitoring studies as the basis for risk management, as recommended by, e.g., relevant Guidelines issued by the International Seabed Authority.
2. Evaluate the environmental risks of alternative project concepts, weighing positive, negative, direct, indirect, cumulative and secondary environmental consequences, provide opportunities for appropriate stakeholder participation in this evaluation, and select and implement the project concepts that give the appropriate balance to environmental, economic and social responsibilities.
3. Develop and implement management strategies preferably to prevent, and if prevention is not feasible, to minimize and maximally mitigate environmental impacts of the selected project.
4. Adopt the precautionary approach in managing identified environmental risks.
5. Develop, test and implement contingency and emergency response plans to address incidents and unusual operating and environmental conditions, in collaboration with potentially affected parties and relevant government agencies.
6. Develop and implement appropriate long-term environmental monitoring programs at suitable spatial and temporal scales.

7. Establish[2] procedures in consultation with the marine scientific community to aid in the recruitment, re-establishment and migration of biota and to assist in the study of undisturbed, comparable habitats before, during, and after mining operations that are suitably close to mining operations for this purpose.
8. Inform interested and/or potentially affected parties, as part of stakeholder consultations, of any significant environmental risks from mining operations and of the measures that will be taken to manage these risks.

Integrated Environmental Management. Recognize environmentally responsible and sustainable management as a company/entity priority and integrate environmentally responsible and sustainable management into all operations from exploration, through design and construction to mining, minerals processing, waste disposal, mine site rehabilitation and decommissioning.

1. Establish a senior executive environmental manager, preferably accountable to the CEO, and an environmental management system that allocates management and employee responsibilities relevant to:
   - The company/entity's activities
   - Applicable legal and regulatory requirements
   - The Operating Guidelines of this Code and of any other applicable Code or Guidelines
   - Company/entity environmental policies, objectives and targets
   - Environmental management plans and procedures
   - Environmental monitoring procedures
   - Reliable, secure, transparent and accessible storage for environmental data and, where practical, specimens collected
   - Setting and testing of contingency and emergency response plans
   - Regular or otherwise appropriately scheduled auditing of the environmental management system and environmental performance
   - Internal and external reporting procedures.

2. Periodically review and update the environmental management system in a structured, iterative process that involves the local or affected community, to ensure that the system remains up-to-date, effective and relevant to the company/entity's evolving needs, improvements in best fit-for-purpose environmental practices, and to changing community values and expectations.

Company/Entity Environmental Performance Targets. Set environmental performance targets that meet and aim to exceed the requirements of directly applicable legislation, regulations, licenses and permits. Specifically:

1. Identify legal and other requirements applicable to the environmental aspects of the company/entity's marine mining activities, products or services.

[2] Unless such procedures are already established by the International Seabed Authority, the relevant coastal State(s) or other competent authority according to the latest scientific criteria.

2. Set internal environmental performance targets and periodically assess achievements in order to reinforce policy commitments and to enable demonstration of continual improvement.
3. Ensure that legal requirements and internal performance targets are effectively communicated to the employees and contractors who are accountable for the relevant activities.

Review, Improvement and Updating of Environmental Policies and Standards. Implement management strategies to meet current and anticipated environmental standards and regularly review targets in the context of changing company/entity and community needs, aspirations, legal requirements and ISO criteria to achieve optimal environmental management.

1. Regularly review and update company/entity environmental policies, programs and performance to correct any deficiencies.
2. Assess and rank environmental issues to identify priority areas where maximum environmental benefits are achievable.
3. Undertake, participate in, and/or support research on priority environmental issues by, e.g., appropriate funding, on-site support, etc.
4. Facilitate employee education about non-proprietary environmentally related technical developments, scientific understanding, consumer needs and community expectations as needed to improve their understanding of the company/entity's environmental policies.
5. Provide technical and professional level skill-enhancement opportunities to environmental employees, e.g., through attendance at appropriate workshops and conferences.
6. Provide professional environmental employees with reporting opportunities on non-proprietary environmental topics at relevant conferences and in refereed international environmental publications.
7. Facilitate communication of relevant, non-proprietary information to the community about environmentally related technical developments, scientific knowledge, consumer needs and community expectations as needed to improve their understanding of the company/entity's environmental policies.

Rehabilitation and Decommissioning. Taking into account former, current and future beneficial uses of the site and its surrounding environment, develop and implement an appropriate closure plan to leave decommissioned sites and associated ecosystems in a safe, stable, and where possible, rehabilitated condition, carried out according to best fit-for-purpose practices.

1. Incorporate ecosystem and site rehabilitation and decommissioning options in the conceptual design of operations at the feasibility-study stage.
2. Develop clearly defined ecosystem and site rehabilitation plans and targets, monitor and review rehabilitation performance and progressively refine such plans against the targets.
3. Determine and account for ecosystem and site rehabilitation and decommissioning costs, periodically review their adequacy during the life of the operation, and adjust budget to meet any increases in those costs.

4. Establish a program of progressive ecosystem and site rehabilitation commensurate with the nature of the operation and the type and rate of disturbance.
5. Periodically review the ecosystem and site rehabilitation and decommissioning strategies during the period of operations so as to incorporate changing regulatory requirements, public expectations, and environmental and cultural information.
6. Address issues and programs related to long-term responsibility for the seabed and associated ecosystems in the final decommissioning plan, including long-term monitoring and definition of the period necessary to ensure remediation plans are effective and that any unforeseen consequences are detected.
7. Provide adequate compensation using appropriate mechanisms where damage is caused due to company/entity/project activities.

Reporting and Documentation. Demonstrate commitment to the Code's principles by reporting on the company/entity's implementation of the Code and its environmental performance.

1. Implement regular (at least annual) reporting of environmental performance to all stakeholders, including the board of directors, shareholders, employees, relevant government bodies and authorities, local communities, scientific researchers, non-governmental organizations, and the general public.
2. Ensure that reporting requirements of all authorities are met in scope and in good time.
3. Provide an annual environmental report written for community understanding.
4. Reports should describe the company/entity's processes for:
   - Setting and communicating environmental policy
   - Assessing and communicating environmental performance
   - Community consultation and responding to concerns
   - Code implementation.
5. Reports should also include but not be limited to:
   - Organization profile, environmental policies and objectives
   - Environmental management processes
   - Establishment of benchmarks against which continual improvement can be measured
   - Documentation and availability for eventual independent review by interested parties at their expense of relevant, site-specific data to support the reported results
   - Opportunities and progress in improvements
   - Significant environmental events and their consequences
   - Environmental incidents, "near-misses" and any regulatory and remedial action taken
   - Performance in relation to regulatory requirements and internal targets
   - Environmental, socio-economic and cultural issues to be addressed and strategies to address and implement these issues.
6. The first report after adoption of the Code by the company/entity is to be released within two years.
7. The annual environmental reports are to be made available for consultation, free of charge, to the public through the company/entity's corporate and regional offices and on the company/entity's website. Additional copies, preferably in electronic form, of each annual report may be lodged in the central library of the State(s) exercising sovereign rights or jurisdiction where the company/entity operates or, in the case of

activities carried out in areas beyond national jurisdiction, in the central library of the State where the company/entity is incorporated. Companies/entities will identify where additional copies will be deposited when they make their annual report and on the company/entity's website.

Environmental Data Collection, Exchange and Archiving. Facilitate free exchange and easily accessible availability of environmental information and geological and biological sample collections gathered (other than proprietary technical information) for international scientific peer review and understanding and national and global heritage use.

1. Exclude non-proprietary environmental data from confidentiality requirements, standardize these data according to the latest and highest standards for the relevant discipline in order to facilitate analysis and comparisons, and make these data freely available to all stakeholders and for exchange, review and analysis in fora such as workshops.
2. Deposit on request non-proprietary environmental data securely in freely and easily accessible appropriate national and international archives for review, further scientific analysis and reporting.
3. Deposit for review, further reporting, and scientific research representative collections of geological and biological specimens in appropriate repositories with requisite long-term storage facilities, which may include national museums, government institutions, relevant specialized global repositories and universities, on request and after prior consultation with the selected host(s); such consultation to occur early in the project planning.
4. Preserve, report and deliver any incidentally collected cultural, archaeological and anthropological artifacts are to appropriate agencies and repositories.
5. Disseminate non-proprietary scientific data on and lessons learned in marine environmental and biodiversity assessment and management.
6. Promote good practices in marine environmental and biodiversity assessment and management.

Performance Reviews. Regularly (preferably every three years) evaluate company/entity performance under the Code by a team of qualified, externally accredited environmental auditors both from within and independent of the adopting company/entity.

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Annex 1

IMMS CODE FOR ENVIRONMENTAL MANAGEMENT OF MARINE MINING

Implementation and Feedback Form

No.	ITEM	DETAILS
1.	Company / stakeholder name	
2.	Contact : Person's name Address Email Phone Fax Website	
3.	Activity (ies) for which the Code is adopted	
4.	Measures taken for implementing the Code	
5.	Problems encountered while implementing the Code	
6.	Corrective action taken	
7.	Suggestions for revising the Code	
8.	Any other information	
	Date:	Signature

Fax or email to:

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Appendix 1

Published Sources Consulted

Australian Commonwealth Scientific and Industrial Research Organisation (CSIRO)

Seafloor exploration and mining industry: a desktop study of international and selected country experiences (Tsamenyi, Kaye and Mfodwo, 2007).

Exploring the social dimensions of Australia's seafloor exploration and mining industry. (Littleboy and Boughen, 2007) Report number P2007/917. Wealth from Oceans Flagship.

Convention on Biological Diversity Secretariat (2006)

Voluntary guidelines for biodiversity-inclusive impact assessment. Available at: http://www.cbd.int/impact/guidelines.shtml.

The Ecosystem Approach Beginners' Guide. Available at: http://www.cbd.int/ecosystem/sourcebook/beginner-guide/.

The Ecosystem Approach Advanced User Guide. Available at: http://www.cbd.int/ecosystem/sourcebook/advanced-guide/.

Global Reporting Initiative

Sustainability Reporting Framework Overview. Available at: http://www.globalreporting.org/ReportingFramework/ReportingFrameworkOverview/.

Sustainability Reporting Guidelines (G3 Guidelines, 2006). Available at: http://www.globalreporting.org/ReportingFramework/G3Guidelines/.

Draft Final Mining and Metals Sector Supplement. Available at: http://www.globalreporting.org/ReportingFramework/SectorSupplements/MiningAndMetals/.

Greenpeace International

Mining Submarine Tailings Disposal [Std] – Summary Concepts. Available at: http://www.imo.org/includes/blastData.asp/doc_id=9122/INF-14.pdf.

International Council on Mining and Metals (ICMM)

Sustainable Development Framework. Available at: http://www.icmm.com/our-work/sustainable-development-framework/.

Sustainable Development Framework - 10 Principles. Available at: http://www.icmm.com/our-work/sustainable-development-framework/10-principles.

Sustainable Development Framework - Public Reporting. Available at: *http://www.icmm.com/our-work/sustainable-development-framework/public-reporting.*

Sustainable Development Framework - Assurance. Available at: http://www.icmm.com/our-work/sustainable-development-framework/assurance.

Good Practice Guidance for Mining and Biodiversity 2004. Available at: http://www.icmm.com/page/1182/good-practice-guidance-for-mining-and-biodiversity.

Planning For Integrated Mine Closure Toolkit. Available at: http://www.icmm.com/page/9568/planning-for-integrated-mine-closure-toolkit.

Good Practice: Sustainable Development in the Mining and Metals Sector website. Documents available at: http://www.goodpracticemining.org/.

Tailings: Good Practice website. Documents available at: http://www.goodpracticemining.com/tailings/.

International Institute for Environment and Development (IIED)

Mining, Minerals and Sustainable Development Project. Available at: http://www.iied.org/sustainable-markets/key-issues/business-and-sustainable-development/mining-minerals-and-sustainable-development#resources.

MMSD Final Report: Breaking New Ground. Available at: http://www.iied.org/pubs/display.php?o=9084IIED.

Finding the Way Forward: how could voluntary action move mining towards sustainable development? Available at: http://www.iied.org/pubs/display.php?o=9203IIED.

Room to Manoeuvre? Mining, biodiversity and protected areas. Available at: http://www.iied.org/pubs/display.php?o=9266IIED.

Finding Common Ground: Indigenous Peoples and their Association with the Mining Sector. Available at: http://www.iied.org/pubs/display.php?o=9267IIED.

International Seabed Authority

Regulations on Prospecting and Exploration for Polymetallic Nodules in the Area (adopted 13 July 2000). Available at: http://www.isa.org.jm/en/documents/mcode.

Draft Regulations on Prospecting and Exploration for Polymetallic Sulphides in the Area (ISBA/13/C/WP.1). Available at: http://www.isa.org.jm/en/sessions/2007/documents/.

Draft Regulations on Prospecting and Exploration for cobalt-rich ferromanganese crusts in the Area (ISBA/13/LTC/WP.1). Available at: http://www.isa.org.jm/files/documents/EN/13Sess/LTC/ISBA-13LTC-WP1.pdf.

Legal and Technical Commission Recommendations for the guidance of contractors on the assessment of the environmental impacts of exploration for polymetallic nodules. Available at: http://www.isa.org.jm/files/documents/EN/7Sess/LTC/isba_7ltc_1Rev1.pdf.

Minerals Council of Australia

The Australian Minerals Industry Code for Environmental Management (2000; formally retired in 2005). Available at: http://www.minerals.org.au.

Enduring Value - the Australian Minerals Industry Framework for Sustainable Development (2005-present). Available at: http://www.minerals.org.au.

Offshore Minerals Policy - The Madang Guidelines (1999)
(Available from IMMS Administrator)

Scottish Association of Marine Science (SAMS)- European Union (EU)

Project on Deep-sea Tailings Placement (DSTP) for Papua New Guinea (PNG): available at: http://www.sams.ac.uk/sams-news/events-sams/png-conference/about-the-png-contract.

Other Sources:

Industry experience with environmental assessments related to:

- Marine mining in South Africa and Namibia (diamonds), Hawaii (Co-rich ferromanganese crusts), Alaska (gold), Papua New Guinea (seafloor massive sulphides) and Southeast Asia (tin).
- Dredging in Europe and North America for borrow sand, construction aggregate and channel navigation.
- Marine disposal of tailings from coastal mines in Canada, Alaska and the Southeast Asia/South Pacific archipelagoes.
- In addition, for benchmarking the Operating Guidelines, the Code draws on the globally extensive deep water experience by American, Australian, British, Canadian, Chinese, Danish, Dutch, French, German, Indian, Japanese, Korean, New Zealand, and Russian Federation oceanographers and marine biologists on biodiversity assessment of hydrothermal vents, nodule and crust deposits and metalliferous muds extending back over more than 100 years to the *Challenger* Expedition of 1873-1876.

Appendix 2
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