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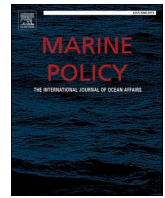
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Best regulatory practices for deep seabed mining: Lessons learned from the U.S. Surface Mining Control and Reclamation Act[☆]

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A B S T R A C T

Mining operations around the globe are responsible for significant environmental problems. These problems often stem from poor planning, inadequate regulatory standards, and a failure of regulatory oversight, particularly with respect to inspection and enforcement regimes. Mining regulators are often hamstrung, however, by inadequate information about potential impacts before operations commence. This problem is particularly daunting when considering mining on ocean floors where information about the environment is limited, and the impacts of mining are poorly understood.

As the International Seabed Authority (ISA) develops a comprehensive regulatory program for deep seabed mining, they should draw on the experience gained in regulating terrestrial mining, subject, of course, to the caveat that deep seabed mining poses unique challenges that will require different and sometimes innovative regulatory solutions. In reviewing regulatory programs for terrestrial mining operations, one would be hard-pressed to find a program that is more thorough and creative than that established by the U.S. Surface Mining Control and Reclamation Act (SMCRA). For reasons that are related primarily to the contentious politics surrounding coal mining regulation in the United States, SMCRA has never lived up to its promise. Nonetheless, the law remains largely intact and, despite its implementation challenges, affords a useful framework for thinking about an appropriate strategy for regulating deep seabed mining.

This case study outlines the contours of the regulatory program established under SMCRA insofar as it may be relevant to regulating deep seabed mining. It acknowledges some of SMCRA's flaws and omissions, and where appropriate, it suggests regulatory practices that go beyond SMCRA. Nonetheless, and despite SMCRA's limitations, the program established under this law reflects modern thinking about the procedures that should be followed in managing mining activities in challenging environments, and thus offers a useful lens for designing a regulatory program for deep seabed mining.

1. Introduction

Mining operations around the globe are responsible for significant environmental problems stemming from poor planning, inadequate regulatory standards, and a failure of inspection and enforcement regimes. Mining regulators also face the challenge of obtaining adequate information about potential impacts before operations commence. This problem will be particularly daunting on ocean floors where information about the environment is limited, and the impacts of mining are poorly understood.

As the International Seabed Authority (ISA) develops a comprehensive regulatory program for deep seabed mining, they should draw on the experience gained in regulating terrestrial mining, subject, of course, to the caveat that deep seabed mining will pose unique challenges that will require different and sometimes innovative regulatory solutions.

In reviewing regulatory programs developed for terrestrial mining operations, few are likely to match the thorough and creative regulatory program established under the U.S. Surface Mining Control and Reclamation Act (SMCRA) [20]. For reasons that are related primarily to the

contentious politics surrounding coal mining regulation in the United States, SMCRA has never lived up to its promise. Nonetheless, the law remains largely intact and, despite its implementation challenges, affords a useful framework for thinking about an appropriate strategy for regulating deep seabed mining.

This case study outlines the contours of the regulatory program established under SMCRA insofar as it may be relevant to regulating deep seabed mining. It also acknowledges some of SMCRA's flaws and omissions. Where appropriate, it suggests regulatory practices that go beyond SMCRA but nonetheless reflect modern thinking about regulating activities that disturb the natural environment.

This case study begins with an overview of SMCRA as necessary to provide context for the study. It then describes the four key parts of a successful regulatory program for mining operations: (1) a regulatory agency with comprehensive authority to regulate mining activities; (2) a planning and permitting process that includes requirements for insurance to cover possible liabilities, and bonding to ensure sufficient funding to cover costs of reclamation and restoration; (3) comprehensive performance standards for exploration, mining, and reclamation

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developed with input from all relevant stakeholders; and (4) compliance tools, especially inspection and enforcement protocols and strategies, necessary to ensure compliance with permit conditions and all regulatory standards.

At the end of each section I adapt the lessons learned from SMCRA and other sources to set forth proposed recommendations that I believe reflect best practices for deep seabed mining.

2. The U.S. Surface Mining Control and Reclamation Act 1977

Coal mining – and especially surface coal mining – causes significant adverse impacts to land and water resources in the area of mining. A large surface mine often requires rerouting perennial and ephemeral streams that pass through the mining area and it can disrupt and contaminate ground water aquifers. Surface mining also requires moving massive amounts of overburden – the material above the coal seam – and poor mine planning and poor reclamation practices typically means that the overburden is poorly managed resulting in serious adverse environmental impacts and the long-term loss of the productive use of the mined land. The poor coal mining and reclamation practices historically employed on the steep slopes of the coal fields in the Appalachian region of the eastern United States were particularly devastating to the local environment. Mine operators clogged mountain streams with waste rock and discharged toxic metals into those streams. Little effort was made to reclaim the large swaths of mined land, which were rendered virtually unusable for any productive purpose.

The U.S. federal government responded by enacting the Surface Coal Mining and Reclamation Act of 1977,¹ which establishes a rigorous and comprehensive program for planning, operating, and reclaiming coal mined lands throughout the United States. The program is supported by a strict enforcement regimen that imposes significant consequences for non-compliance.

Deep seabed mining, of course, is quite different from land-based coal mining. But the program that SMCRA establishes – the measures on planning and permitting, the commitment to performance standards for mining operations, and the strict protocols for enforcement – offer useful insights into how to structure a program for managing deep seabed mining. Applying these insights from SMCRA to deep seabed mining is the ultimate goal of this article.

3. The critical role of the regulatory authority

3.1. The structure of the agency

An essential element of any comprehensive regulatory program is a regulatory agency with sufficient technical expertise, legal authority, and independence from political influence to administer the program. When SMCRA was enacted in 1977 it introduced a comprehensive regulatory program to be administered by an entirely new federal agency – the Office of Surface Mining Reclamation and Enforcement (OSMRE). The agency was carefully designed with the technical expertise and legal authority to carry out its mission, including the authority to: (1) administer programs for controlling surface coal mining operations and approving or disapproving state programs established for that purpose; (2) carry out investigations and inspections with a full panoply of enforcement tools where violations of the law are found; (3) promulgate rules as necessary to exercise its authority; and (4) carry out relevant research and demonstration projects as needed to further the goals of the law. Unfortunately, SMCRA has suffered from significant political interference [7], along with a related problem of inadequate funding. As described below, the OSMRE has also been hampered by having to carry out its responsibilities largely through individual states, some of which have proved hostile to SMCRA's goals.

The International Seabed Authority (ISA) holds the potential for operating an effective regulatory program for seabed mining while avoiding the pitfalls faced by OSMRE. A challenge will be navigating the complex management framework established for the ISA under the United Nations Convention on the Law of the Sea (UNCLOS) [3,8],² and the uncertainties and limitations inherent in the international legal system.

Under UNCLOS, the ISA comprises, several key entities including, an Assembly, a Council and a Secretariat.³ The Assembly includes all member state signatories of UNCLOS and they enjoy equal voting rights [9].⁴ Among other things, the Assembly elects a 36-person Council from among its members. The Secretariat includes the Secretary-General, elected by the Assembly from among the candidates proposed by the Council,⁵ and a staff. UNCLOS further provides for organs of the Council, including an Economic Planning Commission⁶ and a Legal and Technical Commission.⁷ Each Commission has at least 15 members elected by the Council from among qualified persons nominated by State Parties.⁸

UNCLOS also establishes “the Enterprise,” an organ within the ISA authorized to carry out prospecting, exploration, and exploitation activities in “the Area,” the term used in UNCLOS to refer to “the seabed and ocean floor and subsoil thereof, beyond the limits of national jurisdiction.”⁹ Thus, the Enterprise may engage directly in deep seabed mining activities on the ISA's behalf. Although it could play an important role in field testing mining practices and assessing impacts, the Enterprise has never been operationalized.¹⁰ While it may seem daunting to establish the Enterprise as a functioning entity capable of carrying out mining activities, such an effort would do much to inform the ISA about the technical and economic challenges that operators will face and the unanticipated consequences of engaging in deep seabed mining activities. This information would be extremely helpful to the ISA in identifying appropriate standards for approving third-party mining operations [3,8].¹¹

Among the potentially problematic provisions of UNCLOS is the rather confusing process it establishes for making decisions. Under a

² Convention on the Law of the Sea, Dec. 10, 1982, 1833 U.N.T.S. 397. Enacted as: entered into force as the “United Nations Convention on the Law of the Sea” on Nov. 1, 1994 (hereafter UNCLOS).

³ UNCLOS, Article 158, § 1.

⁴ Id. at Articles 159–160.

⁵ Id. at Article 166.

⁶ Id. at Article 164. The Economic Planning Commission has not yet been constituted, in line with the 1994 Agreement relating to the implementation of Part XI of UNCLOS, which provided that ‘The functions of the Economic Planning Commission shall be performed by the Legal and Technical Commission until such time as the Council decides otherwise or until the approval of the first plan of work for exploitation’. [Agreement, Annex, Section 1, Paragraph 4]

⁷ Id. at Article 163.

⁸ As of 1 January 2017, the Legal and Technical Commission had 30 members, see: <https://www.isa.org.jm/la-autoridad/legal-and-technical-commission>.

⁹ Id. at Article 1, § 1.

¹⁰ For further on this point, see a February 2019 submission by the African Group of countries, available online here: <https://www.isa.org.jm/document/statement-algeria-obo-african-group-1>; and a June 2019 technical study commissioned by the ISA Secretariat at the ISA Council's request, here: <https://www.isa.org.jm/document/study-issues-related-operationalization-enterpris-e-1>

¹¹ A detailed study on operationalizing the Enterprise is Edwin Egede, Mati Pal and Eden Charles, *A Study on Issues Related to the Operationalization of the Enterprise in Particular on the Legal, Technical and Financial Implications for the International Seabed Authority and for States Parties to the United Nations Convention on the Law of the Sea* (13 June 2019), available at, https://ran-s3.s3.amazonaws.com/isa.org.jm/s3fs-public/files/documents/study-enterprise-unedited_advance_text-11jul2019.pdf.

¹ 30 U.S.C. 1201 et seq.

1994 Agreement that effectively amends UNCLOS, the Assembly works in collaboration with the Council to make decisions [9].¹² The Agreement states a preference for consensus-based decision-making for all “organs of the Authority.”¹³ When efforts to achieve consensus fail, the Agreement provides that decisions of the Assembly on matter of procedure require “a majority of members present and voting;” on substantive matters, decisions require two-thirds of the members present and voting.¹⁴ A similar requirement applies to decisions reserved to the Council – a majority for procedural decisions and a two-thirds majority for matter of substance decisions.¹⁵

The Council serves as the primary decision-making body for many important substantive decisions but it cannot act unless it commands a full two-thirds of the Council. So, for example, if a substantial majority but less than two-thirds of the Council believes that a party is violating their contract or ISA rules, the Council would be hamstrung in its ability to institute proceedings on behalf of the Authority before the Seabed Disputes Chamber as otherwise authorized by the Convention.¹⁶ This suggests a need to embed in contracts enforcement mechanisms and sanctions for violations of the terms of the contracts or violations of other ISA rules.

On the critical question of the approval of plans of work, the ISA speaks through the Council, which decides whether to approve or disapprove an application for a plan of work after receiving a recommendation of approval from the Legal and Technical Commission.¹⁷ Under Annex III, approval of a plan of work appears to be automatic if the specific conditions of Annex III, Article 6 are met.¹⁸ The 1994 Agreement on the Implementation of Part XI of UNCLOS further provides that the Council must approve a recommendation by the Commission for approval of a plan of work unless a two-thirds majority, including a majority of members in each of the two chambers that make up the Council, decides to disapprove the plan of work. Moreover, if the Council does not make a decision within a prescribed period (normally 60 days), the recommendation is deemed approved by the Council at the end of that period.¹⁹ Thus, and somewhat oddly, it is difficult for the Council to disapprove a plan of work, where its advisory body (the Commission) has recommended approval. Moreover, even if the Commission recommends disapproval of the plan of work, it can still be approved by the Council but it requires a three-fourths majority.

Recommendation 1. Require Pilot Projects through the Enterprise: Initial proposals for exploitation should be limited to “pilot projects” by the Enterprise. Because the Enterprise is an arm of the ISA it will be far easier to exercise monitoring, oversight, and control, over its activities.

¹² Agreement Relating to the Implementation of Part XI of the Convention, Annex, Section 3, Decision-making (1994).

¹³ UNLCOS, at Article 162, § 2(j)(ii).

¹⁴ See Annex to the 1994 Agreement, Section 2 § 2, noting that “the Enterprise shall conduct its initial deep seabed mining operations through joint ventures”.

¹⁵ As described in the next section, UNCLOS implores the Council to choose Commissioners with highest competence and integrity but it does not speak to these attributes in choosing members of the Council. See Article 163, § 3.

¹⁶ 30 U.S.C § 1265; 30 CFR part 816.

¹⁷ Article 163, § 3. Despite this requirement, at least one author found that “[t]he expertise currently represented in the LTC does not reflect the Commission’s far-ranging environmental management competencies.” ALINE JAECKEL, THE INTERNATIONAL SEABED AUTHORITY AND THE PRECAUTIONARY PRINCIPLE, at 289–291 (2017), available at, <https://brill.com/view/title/33967?language=en>. Information about the Commission and its membership can be found on the ISA website. See <https://www.isa.org.jm/authority/legal-and-technical-commission>. See also, James Harrison, *The International Seabed Authority and the Development of the Legal Regime for Deep Seabed Mining*, University of Edinburgh School of Law, Working Paper Series, No. 2010/17 (2010) for a more complete description of the Commission and its work.

¹⁸ Annex III, Article 6, § 3.

¹⁹ The 1994 Agreement, Annex, Section 3, § 11. The two “chambers” of the Council are described at § 15 of the 1994 Agreement.

Pilot projects should continue until the Legal and Technical Commission learns enough about the issues and problems associated with deep seabed mining to propose contract conditions and regulations for non-Enterprise sponsored projects that will ensure smart management of mining activities and an appropriate level of protection for the marine environment.

Recommendation 2. Select Commissioners Wisely: The selection of Commissioners could very well determine the success of the seabed mining program. A workable structure should involve a strategy or criteria to ensure that all ISA representatives, but Commissioners especially, are informed about the relevant issues, possess the utmost integrity and impartiality, and have a strong commitment to working collaboratively.

Recommendation 3. Afford the Commission the Discretion to Disapprove a Plan of Work. Reviewing a plan of work and assessing its impacts and its potential to cause significant environmental harm involves a complex assessment of the proposed mining operations, the site where mining will take place, and the capacity of the operator to carry out mining activities in full compliance with UNCLOS and their plan of work. Because this assessment involves a subjective and expert judgment about the overall merits of approving a particular plan of work, the Commission should retain the discretion to recommend disapproval of a plan, and the Council should retain the discretion to deny a plan, even if that plan satisfies the technical requirements of the rules if, for example, the Commission or the Council believes that the risks posed by the plan are too great to justify its approval.

3.2. Agency expertise

Carrying out surface coal mining operations without causing significant environmental problems is challenging. Accessing the coal seam requires a great deal of land disturbance, which may disrupt surface water runoff patterns or roads and power line rights-of-way. And this is just the beginning. SMCRA and its implementing regulations set standards for myriad substantive issues that can arise during surface mining operations including soil restoration, protection of hydrologic systems, managing blasting operations, wildlife and wildlife habitat protection, revegetation, and reclamation. The operation of this system through various stages of a mining operation is described in more detail below. But OSMRE necessarily employs technical staff with a deep understanding of these resources and the mining techniques needed to avoid and/or minimize adverse impacts.

Impartial technical staff must be available to review applications for adequacy, evaluate proposed mining techniques and alternatives, monitor performance by operators, inspect operations, take appropriate enforcement actions where necessary, and assure appropriate corrections to identified problems. Because problems are often encountered for which good solutions are not presently available, OSMRE also needs the capacity to promote and engage in high quality research on ways to improve mining techniques and minimize environmental impacts.

Deep seabed mining raises a very different set of environmental issues but the management framework required should be remarkably similar. Under Article 165, the Legal and Technical Commission must have appropriate expertise on matters “relevant to exploration for and exploitation and processing of mineral resources, oceanology, protection of the marine environment, or economic or legal matters relating to ocean mining and related fields of expertise.” Moreover, States are implored to nominate (and the Council to elect) Commissioners with “the highest standards of competence and integrity with qualifications in relevant fields so as to ensure the effective exercise of the functions of the Commissions” [4,5]. If followed, this mandate will help ensure the independence of the Commission and limit its susceptibility to political influence.

Recommendation 3. Provide Strong Oversight for the Commission and its Work: The Council should constantly review the work and membership of the Commission and seek regular advice from independent experts

regarding the competence, integrity, and work of Commission members, as well as whether its overall composition meets the multi-disciplinary criteria required by Article 165 of UNCLOS.

Recommendation 4. Award Commissioners Staggered Five-Year Terms: The Commissioners should sit for staggered five-year terms. In order to bring fresh ideas to the Commission, the Council should appoint new Commissioners at the end of each five-year term.²⁰

3.3. The relationship between the regulatory authority and individual states

Under SMCRA, OSMRE administers the surface coal mining regulation program, but also authorizes individual American states to assume primary responsibility for regulation, subject to strict conditions and comprehensive oversight. This is not unlike the provisions of UNCLOS Annex III, under which States must ensure that any contractor that they sponsor operates consistent with their contract and UNCLOS. This devolution of authority presents challenges.

SMCRA establishes a robust State oversight program that includes an elaborate application and public review process, followed by regular reviews of program administration and independent enforcement powers, all designed to ensure that State agencies have adequate resources, technical expertise, and legal authority to manage their regulatory programs. OSMRE may withdraw its approval on finding that the State is not meeting its obligations. In that case, OSMRE assumes primary responsibility itself for regulation.²¹

Notwithstanding its political appeal, this “cooperative federalism” model of shared responsibility between state and federal actors, is likely to be less efficient or effective than a single regulator. It is inefficient for requiring significant duplication of effort by both the State agency and OSMRE in terms of developing, implementing, and enforcing regulatory standards. It is also less effective for inviting conflict between state and federal regulators. Withdrawing approval, meanwhile, turns out to be a largely illusory threat. The time and cost for OSMRE to gear up to run a State program are significant and could ultimately prove wasted should the offending State reassert its authority under an improved program.²²

The lesson here seems clear. States can play an important role by establishing a program to oversee the regulator, but a single agency with sufficient resources and authority is more likely to yield better regulation.

The model adopted under UNCLOS seems largely dependent on a single agency with broad authority – the ISA. Nonetheless, Annex III of UNCLOS delegates to the States that are sponsoring an application for exploration or exploitation of minerals:

the responsibility to ensure, within their legal systems, that a contractor so sponsored shall carry out activities in the Area in conformity with the terms of its contract and its obligations under this Convention.²³

The Annex goes on to absolve sponsoring States from liability for damages caused by noncompliance if it has a legal framework and administrative measures in place “reasonably appropriate for securing compliance.”²³ Under UNCLOS, the ISA will thus oversee and approve “front-end” activities, including planning and permitting or contracting

²⁰ Because the existence and extent of coal resources is reasonably well-known, SMCRA does not have a program to regulate prospecting and exploration. Nonetheless, these activities should be subject to some appropriate level of regulation to the extent that they pose environmental risks.

²¹ 30 U.S.C. § 1254.

²² The only significant coal program taken over by OSMRE was in Tennessee in 1984 following Tennessee’s decision to repeal its surface mining law. See *OSMRE Tennessee*, available at, <https://www.arcc.osmre.gov/about/states/tn.sh>

²³ Annex III, Article 4, § 4.

for exploration and exploitation of deep seabed minerals, and at least some significant back-end activities, including the important tasks of carrying out inspections and assessing penalties if necessary. But the sponsoring State is apparently tasked with a significant role in determining compliance with the overall terms of the contract and UNCLOS.

Fleshing out the specific role that sponsoring States are expected to play, and how the ISA and the sponsoring States are supposed to interact on matters relating to contractor compliance, will be critically important. These issues are largely ignored in UNCLOS and the implementing rules [10],²⁴ and while the 2011 Advisory Opinion of the Seabed Disputes Chamber of the International Tribunal for the Law of the Sea makes clear that States have an obligation of due diligence – defined to mean an obligation of conduct and not of result²⁵ – this standard does not ensure compliance and it does not appear that Annex III of UNCLOS affords the ISA any role in addressing noncompliance. Indeed, it seems likely that sponsoring States would resist ISA oversight if the ISA were to assert the authority to oversee State compliance.

Perhaps it would be best to interpret Annex III, Article 4, § 4 as affording sponsoring States *supplemental* authority even as the ISA holds *primary* authority over all aspects of deep seabed mining.²⁶ This will not address the problem raised by the supermajority rules that apply to Council decisions but at least it will give the ISA center stage.

Recommendation 5. Consolidate Power within the ISA. For efficiency and effectiveness, the ISA should consolidate as much power as is permitted under UNCLOS. States can and should play an important role, but should focus on overseeing the work of the ISA Council and its Commissions, particularly where the States themselves are seeking contracts, since States cannot fairly be expected to regulate themselves. This recommendation will require that the ISA receive adequate funding, something that can be achieved by successfully implementing Recommendation 13 on annual fees.

Recommendation 6. Verify Sponsoring State Competence: If the ISA proposes pilot projects carried out by the Enterprise, it will gain experience with the challenges and problems associated with deep seabed mining, as well as the expertise needed to oversee and regulate these activities. Before approving State-sponsored applications, the ISA must confirm that the State has sufficient expertise and commitment to regulate mining “in conformity with the terms of its contract and its obligations under this Convention.”²⁷ The ISA should also demand advance training and certification of State regulators before contracts are approved.

Recommendation 7. Guide the Administration of State-sponsored Projects. A robust program of oversight of State-sponsored projects is critical to ensuring that contract conditions and ISA regulations are enforced consistently, and that any project-specific problems are identified and corrected early on.

²⁴ A 2011 Advisory Opinion of the Seabed Disputes Chamber of the International Tribunal for the Law of the Sea clarified the obligation of the sponsoring State as follows: The sponsoring State’s obligation “to ensure” is not an obligation to achieve, in each and every case, the result that the sponsored contractor complies with the aforementioned obligations. Rather, it is an obligation to deploy adequate means, to exercise best possible efforts, to do the utmost, to obtain this result. To utilize the terminology current in international law, this obligation may be characterized as an obligation “of conduct” and not “of result”, and as an obligation of “due diligence”.

²⁵ The reference to “affiliated companies” should be understood to include subsidiaries, parent companies and sub-contractors.

²⁶ UNCLOS Art 153(4) appears to support this interpretation, providing that the ISA ‘shall exercise such control over activities in the Area as is necessary for the purpose of securing [contractor] compliance [...] and States parties shall assist [the ISA in that duty]’ (emphasis added).

²⁷ A good starting point could be the relevant domestic laws and regulatory structures (if any) in the sponsoring State (see closing paragraphs: <https://www.cigionline.org/publications/sponsoring-state-approaches-liability-regimes-environmental-damage-caused-seabed>).

4. Planning and permitting

4.1. The application process

SMCRA establishes a detailed program for the planning and permitting of coal mining operations. It begins with payment of a fee that is designed to cover the cost of “reviewing, administering, and enforcing the permit.”²⁸ This is followed by a written application that contains identifying information about the applicant,²⁹ including details about its corporate relationships and mining history.³⁰ Applicants must also provide information about:

- mining methods, engineering techniques, and the equipment used or proposed;
- the anticipated starting and termination dates of each phase of mining operation and number of acres of land to be affected; and
- a map showing the land to be affected.

An important feature of SMCRA is a provision that requires the agency to deny a permit to any applicant who is currently violating SMCRA or other environmental protection laws in connection with a coal mining operation³¹ as verified by an online database.³²

In addition to these administrative details, SMCRA requires applicants to submit detailed information about likely impacts. In particular, because of the significant impacts that terrestrial surface mining has on water resources, SMCRA requires applications to contain “a determination of the probable hydrologic consequences of the mining and reclamation operations, both on and off the mine site.”³³

In addition to providing a comprehensive mining plan, permit applicants must also include a detailed reclamation plan in accordance with specific SMCRA requirements, including those related to applicable air and water quality laws, and health and safety standards.³⁴

Under SMCRA, applications must be made available for public inspection, excepting confidential data regarding the coal seam.³⁵ The applicant must also certify that it has liability insurance sufficient to

cover liability for any damages that might occur,³⁶ and a performance bond in an amount “sufficient to assure the completion of the reclamation plan if the work had to be performed by the regulatory authority.”³⁷

SMCRA omits a specific requirement for an environmental and social impact assessment (ESIA).³⁸ However, the U.S. National Environmental Policy Act (NEPA) generally requires an environmental impact statement (EIS) for all major federal actions that might significantly impact the environment.³⁹ Since a substantial percentage of coal mining in the United States occurs on federal land, much American coal mining cannot commence until an EIS process is completed in accordance with NEPA.

At this point, it might seem difficult to compare permitting under SMCRA with contracting, the counterpart to permitting under the ISA regime. The ISA has developed regulations to cover prospecting and exploration for mineral deposits and is now in the process of developing rules for exploitation, which would involve contracting with mining operators. The ISA’s exploration regulations generally address the need for assessing the impacts on the marine environment and require the Legal and Technical Commission to determine that the exploration would not cause serious harmful effects of the marine ecosystem [11].⁴⁰ But much is likely to be learned about managing and regulating deep seabed mining during the exploration phase (or exploitation undertaken by the Enterprise if so agreed) that should be useful in developing exploitation standards.

Recommendation 8. Track Applicant Information and Deny Contracts to Applicants in Violation of ISA Rules: The Council should require comprehensive information about the mine applicant, including any relevant mining history, the names of affiliated companies, and the names of officers and directors. The Council should track this information in a public database⁴¹ and deny applications on evidence of any failures to comply fully with applicable conditions and regulations included in prior approvals.

Recommendation 9. Require a Robust ESIA: No application for exploration or exploitation should be approved until the Legal and Technical Commission has reviewed and verified as satisfactory an ESIA and the integrity of its data and findings. The sufficiency of the ESIA process and content should be measured against the 2018 *World Bank Environmental and Social Framework*⁴² (this is addressed again under Section III.C.2.).

Recommendation 10. Require Small-Scale Test Mining: The ISA should require each applicant to undertake a small-scale mining test and monitoring program, so that the potential impacts from mining are better understood and studied before for full-scale exploitation goes forward. This small-scale test should afford an opportunity for meaningful public engagement, and should be designed to help determine the acceptability of anticipated impacts on human health and safety and on the marine environment. Ideally, the test will allow the Commission and the Council to better understand any potential impacts likely to result from the mining practices outlined in the proposed plan of work. If the initial test fails to yield adequate information to make an informed judgment, the ISA might require a somewhat larger test but one that is still well below a full-scale mining operation. Experienced gained using small-scale testing will position the ISA to tailor this recommendation to

²⁸ 30 U.S.C. §1257(a).

²⁹ *Id.* at § 1264(a).

³⁰ *Id.* at § 1264(b).

³¹ See generally, ALINE JAECKEL, *supra* n. 26 at 14–18.

³² The database is available here: <https://www.osmre.gov/programs/AVS.sh> tm

³³ The ISA regulations on prospecting and exploration define “serious harm to the marine environment” somewhat vaguely to encompass “any effect from activities in the Area on the marine environment which represents a significant adverse change in the marine environment...” See, e.g., International Seabed Authority, *Regulations on Prospecting and Exploration for Polymetallic Sulphides in the Area*, Regulation 1.3(f), ISBA/16/A/12/Rev.1 2 10–63720 (2010). These regulations further make clear that prospecting, exploration, and exploitation should not be approved where substantial evidence supports a risk of serious harm to the marine environment. *Id.* at Regulation 2.2; 23.6(c). But the obligation to gather *substantial evidence* of a risk of serious harm to the marine environment seems inconsistent with the recognition that the impacts from mining activities are highly uncertain, and in many cases, will not be well understood until mining takes place.

³⁴ See ALINE JAECKEL, *supra* n. 26 at 176–177. Jaeckel notes that the precautionary approach is embedded in the exploration regulations and is also a standard clause in ISA contracts. What it means and how it is implemented and enforced, however, seems far less certain. Indeed, the precautionary principle is best applied early in the process to allow the decisionmaker to determine whether the risks warrant issuing a contract in the first instance.

³⁵ Agencies can charge less than these costs but they cannot exceed the estimated costs. 30 U.S.C. § 1257(a). Since review, administration and enforcement are all necessary parts of any sound regulatory program, failing to assess the full cost of administration essentially amounts to a subsidy to the party subject to the fee provisions.

³⁶ Available at, <https://www.isa.org.jm/document/isba24c21>

³⁷ See *Regulations on Prospecting and Exploration for Polymetallic Nodules in the Area*, at Regulation 26.

³⁸ See e.g., *Green Economy in a Blue World*, (UNEP, 2013), available at, <https://wedocs.unep.org/bitstream/handle/20.500.11822/12715/GreenEconomyinBlueWorld%20FullReport.pdf?sequence=1&isAllowed=y>

³⁹ 42 U.S.C. § 4332(2)(C).

⁴⁰ See, e.g., International Seabed Authority, *Regulations on Prospecting and Exploration for Polymetallic Nodules in the Area*, 13 July 2000, as updated on 25 July 2013, ISBA/19/C/17, Regulations 20 and 33, § 4.

⁴¹ The data base could assist the ISA in verifying whether the sponsoring State has “effective control” over the contractor as required by UNCLOS Article 153 (2).

⁴² See especially ¶24 of the *Framework*, at page 18.

reflect particular mining practices and operations to generate the most useful information. ISA Technical Study, No. 11 offers a somewhat similar recommendation [13].⁴³

4.2. The review process

If an application is complete, then SMCRA requires OSMRE or the relevant state agency to act on the application “within a reasonable time.”⁴⁴ The agency may only approve an application after determining that:

- The permit application is accurate and complete and in full compliance with all legal requirements;
- Reclamation as required by the Act and the State or Federal program can be accomplished as provided in the reclamation plan;
- The agency has prepared an assessment of the probable cumulative impact of all anticipated mining on the area’s hydrologic balance and the proposed mine has been designed to prevent material damage to that balance outside permit area.

The agency must also confirm that the mining area does not include any areas designated off-limits to mining.⁴⁵

SMCRA provides for administrative review of agency decisions. This includes requirements for repeated publication in local newspapers and an opportunity for interested parties to file written objections and request an “informal conference” between the agency and relevant parties, which may include a site visit. If an informal conference is held, the agency must issue a written decision granting or denying the permit in whole or in part, within 60 days. Otherwise, the decision must be issued within a reasonable time. Interested parties may appeal the decision to an independent administrative law judge who will hold a trial-type hearing to review the permit decision within 30 days of the request. A written decision by the judge must be issued within 30 days after its conclusion.⁴⁶

The ISA regulations promulgated thus far establish a rather cursory set of criteria for approving exploration plans of work. For example, the applicant must possess the necessary “financial and technical capability” but how one measures this is unclear. Likewise, the proposed plan must provide for “effective protection of human health and safety” and “effective protection and preservation of the marine environment” but the rules are silent as to appropriate metrics for measuring successful protection. These requirements will obviously need to be fleshed out before exploitation is allowed to proceed. As this occurs, the ISA would be wise to recognize the need to follow the precautionary principle [19]. This well-established principle of international environmental law is particularly relevant in situations where an agency seeks to regulate in the face of significant uncertainty. That is certainly the case for deep seabed mining.

⁴³ See International Seabed Authority, *Towards the Development of a Regulatory Framework for Polymetallic Nodule Exploitation in the Area*, ISBA/19/C/5 (2013). (“It is suggested that, prior to the expiration of an exploration licence, the contractor (if interested in proceeding to the mining phase) be required to first apply for a provisional mining licence based upon preparation and submission of a prefeasibility study and workplans to undertake a detailed bankable feasibility study based upon a pilot polymetallic nodule mining operation in the contract area.”)

⁴⁴ 30 U.S.C. §1260(a).

⁴⁵ In a policy statement issued in January 2019, the ISA acknowledged the importance of an independent review process. See *Consideration of a Mechanism and Process for the Independent Review of Environmental Plans and Performance Assessments under the Regulations on Exploitation of Mineral Resources in the Area*, available at, <https://www.isa.org.jm/document/isba25c10>. The policy, however, does not contemplate preparation of the ESIA by an independent third party.

⁴⁶ *Id.* at § 1264(c).

Recommendation 11. Use Publication and Conflict Resolution Processes: As outlined in Section II.A. above, the administrative and decision-making structure for deep seabed mining in UNCLOS is cumbersome, unwieldy, and could lead to anti-majoritarian or arbitrary decisions. Publication of applications and an informal conference or review process, such as that authorized under SMCRA, would add an important level of transparency during the review process and could also afford an opportunity to correct mistakes and improve the final decision. The Council should consider employing such an informal review process to have the benefit of another layer of review before acting upon a recommendation from the Legal and Technical Commission.

Recommendation 12. Follow the Precautionary Principle: Given the high levels of uncertainty associated with deep seabed mining prudence dictates that the ISA follow the precautionary principle in developing standards for exploration and exploitation of deep seabed minerals. In the context of regulating deep seabed mining, the precautionary principle requires first that the ISA engage in a robust assessment of the environmental and social impacts as proposed at Recommendation 15. This must include a discussion of the cumulative impacts associated with authorizing multiple operations in the same geographic region.⁴⁷ The precautionary principle should also imbue the ISA with an affirmative obligation to engage the interested public on any proposal to explore or exploit deep sea minerals and to deny applications where the impacts of mining on the marine environment are highly uncertain but potentially serious [12] even if the applicant has demonstrated technical compliance with requirements of the ISA rules. Adherence to the precautionary principle requires this.

4.3. Other procedural requirements for deep seabed mining

Although there are distinct differences between terrestrial coal mining and deep seabed mining, a number of SMCRA’s permitting procedures may be relevant to the contracting regime for deep seabed mining under UNCLOS. These include: (1) fee recovery provisions; (2) a contract process accompanied by environmental and social impact assessments; (3) a process for public engagement; and (4) administrative review.

4.3.1. Fee provisions

As noted, SMCRA requires applicants to pay an application fee ostensibly commensurate with the cost of its review, administration, and enforcement. Since SMCRA permits are issued for five-year renewable terms, fee calculation requires speculation about anticipated administrative costs. Experience with applications and renewals is likely to improve the accuracy of these estimations.

Article 13, § 2 of Annex III of UNCLOS imposes an administrative fee (currently \$US500,000) for processing an application, and calls for periodic review by the Council to ensure that this fee adequately covers costs. Exploration contractors currently pay an annual administrative fee of \$US60,000.

The ISA regulations describe a default term of 15 years for exploration contracts and provide in addition for multiple five-years contract extensions [11]. The current proposal for exploitation contracts is 30 years.⁴⁸ The ISA decision to award long-term contracts merits reconsideration. Even though many coal mining operations last for more than 30 years, SMCRA limits permits to 5 years with a right of renewal for

⁴⁷ For example, the ISA has approved 16 exploration contracts in the Clarion Clipperton Fracture Zone. If all of these exploration contracts are converted to exploitation contracts within the next 15 years, these projects will collectively cause far greater environmental impact that would be caused by a single project. The precautionary principle demands that all of these projects and their cumulative impacts be considered when reviewing the initial exploitation contract application.

⁴⁸ Available at, <https://www.isa.org.jm/document/isba25cwp1-0>.

operators in full compliance with law.⁴⁹ Importantly, this renewal process requires public participation and could be important for identifying possible adaptive management strategies. The ISA could follow a similar approach thereby affording an opportunity to regularly review contractor performance, and to maintain tighter regulatory control.

Recommendation 13. Require Annual Fees: The ISA must consider an annual fee sufficient to cover the likely costs associated with reviewing applications and carrying out inspection and enforcement activities during the period of commercial production, which may be significant.

Recommendation 14. Set Shorter Contract Terms. The ISA should set shorter terms for contracts. The contractor can be granted a right of renewal but it must be contingent upon a thorough review to ensure full compliance with the terms of its contract and relevant ISA rules. Renewal also affords the public an opportunity for meaningful engagement and may facilitate adaptive management, and an evolving regulatory regime.

4.3.2. An environmental and social impact assessment (ESIA) process

As previously outlined, SMCRA establishes an elaborate permit process but does not, on its own, mandate an ESIA process, although environmental impact statements (EIS) are commonly prepared for American coal mines, especially when they occur on federal lands or involve federal coal.⁵⁰ This is because NEPA requires that federal agencies authorizing any “major federal action [that] significantly affects the quality of the human environment”⁵¹ must prepare an EIS in advance of their decision. Importantly, and unlike most other countries and international organizations with EIA or ESIA mandates, a private applicant cannot prepare the assessment given their potential conflict of interest. Rather, the federal agency charged with reviewing and approving the application must prepare the EIS for the proposed action.⁵²

NEPA also assures a robust “alternatives analysis,” which the federal rules describe as the “heart of the EIS.” This analysis is supposed to “present the environmental impacts of the proposal and the alternatives in comparative form, thus sharply defining the issues and providing a clear basis for choice among options by the decisionmaker and the public.”⁵³ The federal rules also define the scope of an EIS broadly to encompass all connected, cumulative, and similar actions.

A best, but often ignored practice involves assessing the actual impacts of an ongoing project against those predicted in the ESIA. Appropriate conditions in the approval, may allow the regulatory agency to make adjustments reflective of post-decision information.⁵⁴ This “adaptive management” model allows for streamlining the ESIA process in exchange for a robust monitoring program through which parties can ascertain whether predicted and actual impacts coincide, or whether adjustments are required to ensure that performance objectives are met.

The argument in favor of an adaptive management approach is

especially compelling in the face of uncertainty about a project’s impacts. Parties should agree on specific, measurable, achievable, realistic, and time-bound parameters or metrics to inform all stakeholders about a project’s impacts [2]. These metrics should be designed to show deviations from an established baseline. Where necessary, the parties must commit to any adjustments necessary to meet the standards established in the approved operating permit [6].⁵⁵

While adaptive management can create uncertainty for the contractor, it allows for more streamlined activity during the ESIA process. A regulator faced with uncertain impacts from an emerging and activity like deep seabed mining can embrace that uncertainty if the contractor commits to adapting the project to achieve clear environmental goals. An adaptive project can generally get off the ground more quickly, but brings a strong incentive for the contractor to manage the operation to minimize adverse impacts that may trigger a review process and tighter environmental controls.

Notwithstanding the potential advantages of adaptive management protocols, the ISA should recognize the potential limitations of this approach. As Aline Jaeckel has argued, adaptive management may not be appropriate in some circumstances, as for example, where the potential consequences of a deep seabed mining operations are “serious or irreversible,” where the impacts are measured on long-term scales, or where it is being used to avoid “rigorous precautionary actions.”⁵⁶

Recommendation 15. Require Compliance with All Key Elements of an ESIA: A prior recommendation described the need for preparation of an ESIA alongside the application. The above-referenced *World Bank Environmental and Social Framework* elaborates on the parameters of such a document. At a minimum, the ESIA should:

1. Be prepared by an independent third party with no financial stake in the proposed mining operation [14,15]
2. Provide the public with the best baseline data available regarding the pre-mining condition of the area’s seabed and marine environment [11]⁵⁷;
3. Include a robust alternatives analysis that “present[s] the environmental impacts of the proposal and the alternatives in comparative form, thus sharply defining the issues and providing a clear basis for choice among options by the decisionmaker and the public.”⁵⁸
4. Afford meaningful public engagement that embraces a dialogue between the public and the decisionmaker.

The ISA must also use ESIA as a decision-making tool. It must ensure that plans of work are not approved and contracts are not executed unless and until the ISA is satisfied that the potential impacts are acceptable, whether or not the applicant has demonstrated technical compliance with the ISA rules.

Recommendation 16. Adopt an Adaptive Management Protocol: In light of the inherent uncertainties associated with deep seabed mining, the ISA should require contractors to commit to an adaptive management protocol so long as the ISA has exercised an appropriate level of caution in first deciding that the potential adverse impacts of mining are tolerable. As noted above, a short-term contract cycle with rights of renewal,

⁴⁹ 30 U.S.C. § 1256(b) and (d).

⁵⁰ Before the federal government leases federal coal, it typically prepares an environmental impact statement that is supposed to cover the full life cycle of any coal that is produced. See e.g., *High Country Conservation Advocates v. U.S. Forest Service*, 52 F. Supp. 3d 1174 (D. Col. 2014).]

⁵¹ 42 U.S.C. § 4332(2)(C).

⁵² Federal rules allow private parties to prepare an environmental assessment for actions that are not considered to have a significant impact on the environment. Those with significant impacts, however, must be prepared by the agency or a contractor hired by the agency that does not have a financial interest in the outcome of the decision. 40 CFR § 1506.5(b) and (c).

⁵³ 40 CFR § 1502.14.

⁵⁴ By federal rule, “[m]itigation ... and other conditions established in the environmental impact statement ... and committed as part of the decision shall be implemented by the lead agency. 40 CFR § 1505.3(c). Moreover, “[a] monitoring and enforcement program shall be adopted and summarized where applicable for any mitigation.” 40 CFR § 1505.2.

⁵⁵ Adaptive management is sometimes described as “learning while doing.” See Sadahisa Kato & Jack Ahern, *Learning by Doing: Adaptive Planning as a Strategy to Address Uncertainty in Planning*, 51 J. ENV. PLANNING & MGT 543 (2008). It is a way of testing a hypothesis about potential impacts by commencing an activity and then adjusting behaviors as the actual impacts become clear.

⁵⁶ See JAECKEL, *supra*, n. 28 at 60–61.

⁵⁷ Environmental baseline data is specifically required by ISA rules. See e.g., *Decision of the Council of the ISA Relating to Amendments to the Regulations on Prospecting and Exploration for Polymetallic Nodules in the Area and Related Matters*, Regulation 32 (2013).

⁵⁸ 40 CFR § 1502.14.

along with monthly monitoring reports, will help facilitate information that the ISA and the public can use to propose adaptive management strategies.

Recommendation 17. View the ESIA as Living Document: Where a contractor proposes significant changes to a mining plan, or where new information becomes available that forces changes to mining activities, the Legal and Technical Commission should require the applicant to reinstate the ESIA process and amend the contractor's plan of work accordingly.⁵⁹

4.3.3. Formal administrative review

SMCRA adopts a rigorous administrative review process beginning with the previously described "informal conference," but also encompassing formal adjudications of permit decisions under the terms of the U.S. Administrative Procedure Act.⁶⁰ This process allows any interested party to participate in a trial-type hearing before an administrative law judge, with further review of the judge's decision available in federal court.⁶¹

As an international body, review of ISA decisions is necessarily more complicated, but Article XI, Section 5 of UNCLOS lays out a formal dispute resolution process through the Seabed Disputes Chamber of the International Tribunal for the Law of the Sea.

One fundamental difference between formal review procedures under SMCRA and the procedures for deep seabed mining, is the failure to authorize or even contemplate an opportunity for public engagement during the review process. This is surprising, given these resources are recognized by UNCLOS to be the "common heritage of mankind." The public has no recourse to the International Tribunal for the Law of the Sea.

4.3.4. Public participation

SMCRA provides multiple opportunities for public engagement throughout the decision-making process. The public can offer comments on a permit application, including any accompanying environmental or technical documents,⁶² they can request and participate in an informal conference, and if they can show a sufficient interest in the proposed project, they can file an administrative appeal and receive a formal adjudicatory hearing, or intervene in a proceeding brought by another party. As described further below, private citizens can even file a complaint alleging a violation of the permit or other provisions of law. If the complaint is accompanied by credible evidence, the regulatory authority must carry out an inspection.⁶³

The deep seabed mining context, will make it difficult for members of the general public to gain independent, site-specific project information.⁶⁴ To help minimize this problem, comprehensive and transparent reporting and disclosure requirements by the operator and the regulatory agency, including regular environmental auditing reports and detailed inspection reports and records, should be posted quickly and efficiently on a public website. The ISA should facilitate public engagement over deep seabed mining activities by making officials available to respond to questions about these activities. Mining interests'

⁵⁹ Appropriately, the ISA rules require periodic review of exploration plans of work, which is supposed to lead to "such adjustments to its previous programme of activities as are necessary." *Decision of the Council*, *supra* n. 69 at Regulation 28. Adaptive management, however, affords a far more rigorous plan for review and adaptation to the new information.

⁶⁰ 30 U.S.C. § 1263(b)

⁶¹ 5 U.S.C. § 554.

⁶² 30 U.S.C. § 1264(c).

⁶³ See Catherine Danley, *Diving to New Depths: How Green Energy Markets Can Push Mining Companies into the Deep Sea, and Why Nations Must Balance Mineral Exploitation with Marine Conservation*, 44 WM & MARY ENVTL. L. & POL. REV. 219 (2019). See also, JAECKEL, *supra*, n. 28 at 11–14.

⁶⁴ See Rio Principle 10, "Environmental issues are best handled with participation of all concerned citizens, at the relevant level..."

claims about needing to maintain trade secrets should be viewed skeptically, as they could undermine efforts to identify and correct problems.

Recommendation 18. Follow OECD Guidelines on Public Participation. OECD Guidelines [17]⁶⁵ serve as a useful international standard for good public participation strategies for the extractive sector. The ISA should direct its staff to follow these guidelines wherever possible, including the timely publication of regulatory information, such as contractor or inspection reports.

Recommendation 19. Allow Public Participation in Seabed Disputes Chamber Proceedings: To the fullest extent possible, ISA rules should provide for participation by any interested parties in proceedings before the Seabed Disputes Chamber. Participation might be limited to parties who engaged in one or more notice and comment processes associated with the matter before the Chamber but the Chamber should hear from parties who can offer a different perspective on a dispute.

5. Performance standards for deep seabed mining

Ideally, the combination of contracts and regulations for deep seabed mining will be sufficiently comprehensive so as to ensure high levels of protection for the marine environment. Specific performance standards, however, can help guide the content of permits and clarify minimum standards for the operator, the regulatory agency, and the public. SMCRA and its implementing regulations lay out detailed standards for surface coal mining and reclamation operations.⁶⁶

Performance standards for deep seabed mining should begin with a comprehensive monitoring plan that assesses the impact of mining activities on the benthic and other organisms or habitats that might be impacted [16]. For example, a recent article highlights the following concerns about polymetallic nodule mining specifically:

The robotic vehicles crushing ore could also crush 95–100% of organisms living along the vehicle's direct path, while the sediment plumes and wastewater will impact aquatic life from the sea surface down through the water column as wastes are discharged from the surface vessel. Sediment and wastewater at the surface can deplete light and oxygen, which affects photosynthesis and water temperatures. In addition, noise pollution will adversely impact sound-sensitive organisms like marine mammals in the water column and may have unknown impacts at the seabed. Noise pollution can travel 1500 miles or more underwater, and it interferes with species' communication, navigation, hunting, and predator detection.

While vast and diverse, the abyssal plain's ecological consistency, slowness, and stability make it especially vulnerable to deep-sea mining impacts. . . . In short, this is not an ecosystem built to handle catastrophic disturbances [1].

Recommendation 20. Set Specific Performance Standards: The Legal and Technical Commission should recommend specific contractor performance standards to protect public health and safety and the marine environment. These standards should be designed to show deviations from the pre-exploitation, pre-exploration baseline, and capable of easy measurement and monitoring.

Recommendation 21. Use Performance Metrics: Performance standards should include specific metrics for assessing the health of the biota affected by mining as well as specific requirements for documenting data

⁶⁵ *Ecosystem Status Report for the Northeast Large Marine Ecosystem*, available at, <https://www.nefsc.noaa.gov/ecosys/ecosystem-status-report/benthic-invertebrates.html>. *Due Diligence Guidance for Meaningful Stakeholder Engagement in the Extractive Sector*, (Organisation for Economic Co-operation and Development, OECD, 2017) available at, <https://www.oecd.org/publications/oecd-due-diligence-guidance-for-meaningful-stakeholder-engagement-in-the-extractive-sector-9789264252462-en.htm>.

⁶⁶ 30 U.S.C. §1265; 30 CFR part 816.

on species mortalities, particularly for rare or unknown species, and species at risk of extinction.

Recommendation 22. Prepare and Publish Monthly Monitoring Reports: The operator should publish monthly monitoring reports containing specific information about its compliance with performance standards and metrics. Failure to meet the required standards should trigger prompt corrective action. Once mining activities are completed in a particular area, the ISA must require the operator to monitor the impacted zone over a period of time sufficient to satisfy the ISA and the public that an appropriate level of pre-mining biodiversity has been restored to the extent possible, and that the longer-term implications of mining impacts are understood, as necessary to inform future mining decisions.

6. Financial assurances

6.1. Performance bonds

All mining operations are at risk of abandonment of projects before restoration of the mine site. This could result from a change in ownership of the mine, bankruptcy of the mining company, or simply because the original permittee chooses to walk away. To address this risk, SMCRA requires a mine operator to post a performance bond payable to the regulatory authority in an amount “sufficient to assure the completion of the reclamation plan if the work had to be performed by the regulatory authority in the event of forfeiture...”⁶⁷ Thus, the bond helps to avoid both the short- and long-term adverse consequences that could result from abandonment.

Bonding in the context of deep seabed mining may seem out of place. Efforts to reclaim or restore the seabed after mining may be impractical and could even cause further seabed disturbance. But a monitoring program that catalogs the short- and long-term environmental effects of various types of deep seabed mining, including after mineral extraction activities have ended, would seem critical to designing future mining plans. Performance bonds may be needed to guarantee that post-mining monitoring will continue long after mining has ceased. Moreover, a bond can ensure funding for measures to accelerate restoration, even if such restoration has to be arranged by the ISA. Finally, a performance bond can fund compensatory mitigation of adverse impacts where reclamation or restoration may not be possible.

Recommendation 23. Require Performance Bonds: The Council should require all contractors to post a performance bond or equivalent form of third-party protection payable to the ISA in an amount sufficient to allow the ISA to cover the full cost of reclamation, restoration, monitoring, and any compensatory mitigation, if such costs have to be borne by the ISA.

Recommendation 24. Regulate Bond Release: The bond or other posted instrument should not be fully released until the mining activity has ended and all of the contractor’s post-closure obligations have been fulfilled. A partial bond release may be secured during the post-mining period so long as the amount of the bond that remains in place does not fall below the ISA’s anticipated costs to arrange for full post-closure liabilities or activities, as required by the contract.

6.2. Insurance

Over many years mining has imposed massive off-site costs on communities and ecosystems, including serious injuries and loss of human life as well as water contamination, surface subsidence, and harm to structures from activities such as blasting. SMCRA specifically mandates that mine operators obtain public liability insurance, in addition to its bond.⁶⁸ Insurance to cover off-site harms should be

required for two important reasons. First, an independent insurance company can introduce strong incentives to ensure that the mining operations are carried out with care and in accordance with approved standards. Second, insurance can indemnify any third parties injured by mining activities, at least to the extent monetary damages can compensate them.

Insurance can also help to mitigate environmental or third-party damages. Natural resource damage assessments, with concomitant liability, are fairly common in the context of events like oil spills.⁶⁹ It is not inconceivable that deep seabed mining could cause unanticipated damages to the environment, the natural resources of the mining area, or to third-parties. Insurance can safeguard against the public having to bear the cost for those damages.

Recommendation 25. Require Liability Insurance: The mine operator should obtain a liability insurance policy or equivalent instrument in an amount sufficient to cover all of the potential harms to people, property, and natural resources that may occur, on or off the contract area, as a result of the contractor’s deep seabed mining activity, even if the harm is caused by the negligence or gross negligence of the operator. The insurance policy should remain in effect until the mining activity has ended and the performance bond has been released.

7. Inspection & enforcement

7.1. Inspections

Regular inspections of mining operations by qualified personnel are essential to ensuring full compliance with the law. A “qualified” inspector is one certified by an appropriate certification authority as having sufficient training and expertise to identify violations of contract conditions and performance standards relating to the mining activity. One of the many innovative features of SMCRA is its requirement for monthly, unannounced inspections of every single mine site, with “complete” inspections required at least quarterly.⁷⁰ SMCRA further requires an immediate additional inspection “[w]henever, on the basis of any information available to him, including receipt of information from any person, the Secretary has reason to believe that any person is in violation of [the law]”.⁷¹

Inspections for deep seabed mining activities far offshore pose a challenge, because an inspector cannot simply go out to the mine site anytime for a routine inspection, or even if something may be amiss. Ideally, an inspector would live aboard the mining vessel at all times, and multiple inspectors would rotate among different mining operations to ensure that a single inspector does not get too close to mine workers, which could compromise impartial performance. If full-time, on-board inspectors are deemed impractical, then perhaps more robust reporting requirements could be combined with frequent on-site inspections. A substantial degree of on-site inspector work will be necessary to ensure

⁶⁹ The U.S. Department of the Interior operates a natural resource damage assessment and restoration program and their website had substantial information about performing such assessments. See <https://www.doi.gov/restoration>

⁷⁰ 30 U.S.C. § 1267(c).

⁷¹ 30 U.S.C. §1293a) (“No person shall discharge, or in any other way discriminate against, or cause to be fired or discriminated against, any employee or any authorized representative of employees by reason of the fact that such employee or representative has filed, instituted, or caused to be filed or instituted any proceeding under this chapter, or has testified or is about to testify in any proceeding resulting from the administration or enforcement of the provisions of this chapter.”) The ISA’s whistleblower protection requirements should be consistent with best practices identified by the Organisation for Economic Co-operation and Development in *Study on Whistleblower Protection Frameworks, Compendium of Best Practices and Guiding Principles for Legislation*, (OECD, 2010), available at, <https://www.oecd.org/g20/topics/anti-corruption/48972967.pdf>.

⁶⁷ 30 U.S.C. §1259(a).

⁶⁸ 30 U.S.C. §1257(f).

full compliance with the contract and performance standards.

Recommendation 26. Identify Trained Inspectors. The ISA should identify and employ a sufficient number of trained inspectors capable of identifying violations of contracts and the requirements of the ISA rules. If necessary, the ISA may need to establish a training program for inspectors.

Recommendation 27. Operators Must Host Inspectors: The mine operator must be required to host an ISA inspector any time that exploration or exploitation activities are ongoing.

Recommendation 28. Strive to Have Inspectors Onsite 24/7: The ISA should strive to have certified inspectors on board mining vessels at all times when exploration and exploitation activities are taking place, especially during the early years of the program,

Recommendation 29. Prioritize the Reporting Program: As the ISA develops oversight expertise, they may wish to experiment with combinations of regular and robust reporting and frequent onboard inspections. Remote monitoring technology or telepresence may also prove useful. If, however, contractor reports cannot be verified, contain false information, or show repeated violations, the ISA should emphasize onsite inspections.

7.2. Enforcement

Although it has not always been interpreted this way, SMCRA imposes a system of mandatory enforcement.⁷² An inspector is required to cite an operator for any violation observed. Discretion is available in deciding what penalties or other sanctions, if any, to impose on the operator. SMCRA also sets out two levels of violations. A Notice of Violation is for routine noncompliance, while a Cessation Order applies: (1) where the mining operation “creates an imminent danger to the health or safety of the public, or is causing, or can reasonably be expected to cause significant, imminent environmental harm” or (2) where an operator receive a Notice of Violation but fails to abate the violation within the specified time. As its name implies, the Cessation Order requires the cessation of all activities that are relevant to the violation.

SMCRA further authorizes civil or criminal penalties, including imprisonment, to be assessed directly against corporate directors, officers, or agents for knowing or willful violations of the law. And it allows citizen complaints, which require an inspection on credible information supporting their allegations.

Some of these ideas may prove very useful for deep seabed mining. First, mandatory enforcement makes sense where a lone inspector is living on a vessel in the middle of the ocean with a crew of mine operators. If all parties understand that observed violations require a citation, the inspector may feel less pressure to withhold one. OSMRE has generally taken the view that minor violations that are fixable during the course of the inspection need not be cited, perhaps offering a middle ground. But more serious violations that cannot be corrected promptly must be cited. Not all violations will necessarily lead to penalties, but for the sake of transparency it is important to make available to the public and enforcement agencies a complete record of violations committed by every contractor. Among other things, this will expose repeated violations of the same requirement.

While the ISA most likely lacks authority to mete out criminal sanctions, civil penalties, including against corporate directors, officers, or agents, could signal that the ISA is serious about compliance. And as with SMCRA, citizen complaints could be a very useful tool for identifying and resolving enforcement issues.

Finally, the ISA should bear in mind that evidence of non-compliance

⁷² See 30 U.S.C. §1271(a)(3) (“When ... the Secretary or his authorized representative determines that any permittee is in violation of any requirement of this chapter or any permit condition required by this chapter...the Secretary or authorized representative shall issue a notice to the permittee” *Emphasis added.*)

by a contractor may very well come from its employees and contractors. SMCRA includes a “whistleblower protection” provision that encourages employees to come forward with evidence of violations by protecting them from retaliation by the employer [18].

Recommendation 30. Adopt a Mandatory Enforcement Protocol: The ISA should adopt a program of mandatory enforcement. When an inspector sees a violation, they should be obliged to issue a citation unless the violation is minor and can be corrected during the course of the inspection. Information about enforcement actions against contractors should be made available promptly and conspicuously on the ISA’s website.

Recommendation 31. Authorize Stakeholder Complaints: The ISA should establish a process whereby any stakeholder can file written complaints whenever they believe that violations of permits or regulatory standards might exist. If a complaint offers credible evidence, the ISA should order an immediate investigation. If the investigation reveals that a violation has occurred, appropriate action must be taken to address the violation in accordance with the ISA’s enforcement standards.

Recommendation 32. Afford Whistleblower Protection: Employees of the contractor and any other person who performs work for the contractor should be encouraged to report possible violations of permit conditions, performance standards, or any other conditions that pose a risk to public health, safety, or the environment. The contractor should be prohibited from discharging, discriminating against, or otherwise retaliating in any way against any such person who, in good faith, has reported a possible violation or risky condition.

8. Conclusion

Deep seabed mining presents unique challenges for contractors, regulators, and the public. While land-based mining practices differ from deep seabed mining in fundamental ways, much can still be learned about how best to manage deep seabed mining from the experience with terrestrial mining, especially as relates to process.

CRedit authorship contribution statement

Mark Squillace: Conceptualization, Methodology, Writing - original draft preparation. **Hannah Lily:** Supervision. **Andrew Friedman:** Writing - reviewing & editing.

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