

Shallow water and deep sea tailings disposal facilities are designed to have little impact on shallow marine waters, coral reefs and shallow water fisheries. On the other hand, design, construction and operational problems are difficult to contain, remediate, and even detect. Some examples include; blockage of seawater intake by marine organisms, air entering the tailings pipe (Cayeli Bakir), submarine landslides damaging the tailings pipe (Misima). Unforeseen occurrences and operational failures could impact shallow coastal waters, reefs and fisheries, especially when important amounts of tailings are being disposed of. Emergency response mechanisms are important in light of the difficulty resulting from the underwater depths involved.

Accurate and detailed prediction and risk assessment are necessary to address these potential risks. Baseline data and on-going monitoring is a key part of this process. Water and sediment quality has to be monitored “including water column profiles and tailing deposition, impacts on fish populations, metal uptake in fish and impacts of smothering benthos” (Jones and Jones, 2001).

4.7 Shallow Water and Deep Sea Tailings Disposal versus Land disposal

The environmental and socio-economic risks associated to land disposal are well known. In some areas, conditions can significantly threaten the physical and chemical stability of land disposal facilities. The shallow water and deep sea tailings disposal alternative is considered a viable option when the right geographic conditions exist and “where there are significant potential land use conflicts and/or where there are potentially severe consequences associated with the possible [physical or chemical] failure of on-land tailing storage structures” (Jones and Jones, 2001). Best practice requires that at least one land disposal alternative be considered during the feasibility phase.

Considering long-term liability issues associated with land disposal, shallow water and deep sea tailings disposal options have the potential to be less costly. Acid generation treatment and tailings impoundment stewardship are potentially very costly concerns, which are not an issue at shallow water and deep sea disposal sites.

Although the risks associated with land disposal are well known, there is no consensus about the risks associated with shallow water and deep sea tailings disposal between the industry, academics and civil society. The number of shallow water and deep sea disposal case studies is limited and the time frame is such that long term validation is not yet possible. The most extensive data available is for Island Copper where a detailed environmental monitoring programme was carried out for a period of more than 25 years. This concern prompted a call for an international ban on STD and demands that mining companies accept liability for impacts, at an international conference on Submarine Tailings Disposal held in Indonesia in April 2001.¹¹

¹¹ STD is referred to as ocean dumping of mine waste in this case

4.8 Legislation

Marine disposal of mining waste has been permitted at different mine sites around the world. Few countries directly address shallow water or deep sea tailings disposal in their environmental or mining legislation. In many countries, policy on DSTD is arguably not explicit. Whether an activity is permitted within the law depends on a complex array of factors, including whether or not this may be considered as an option by the regulator, as well as how the decision-making processes operate (including the level of non-government participation) (Box A6). The clarity of the law on this topic also depends on the availability of marine disposal sites and alternatives (and thus the extent to which it has been implemented *in practice*). In South Pacific Asia, deep sea tailings disposal is being considered at more sites than any other region, mainly in Indonesia, Papua New Guinea and the Philippines.

Box A6. Examples of national policy regarding submarine tailings disposal

In **Indonesia**, no regulations specifically apply to the disposal of mine waste. There are water quality standards for industrial activities, although this does not include mining. Discharge standards for the mining industry may, however, be specified by the relevant Minister. Failing this, the Governor of the Province in which the project is proposed may use the general water quality standards in determining whether a project may proceed. Environmental impact assessment (EIA) is required for mine projects. Several proposals involving marine tailing disposal have been through the EIA process and approved.

In **Papua New Guinea**, the government allows submarine tailings disposal to be considered alongside other forms of tailings management. The Draft Environmental Code of Practice for the Mining Industry in Papua New Guinea does make reference to submarine tailings disposal as a waste disposal option. There is a requirement for environmental impact assessment of mine projects and a permit under the Water Resources Act, 1982. Four projects with DSTD have been approved: Misima, Lihir, Simberi Gold Project and Ramu Nickel Project.

In the **Philippines**, specific government policy regarding deep sea tailings disposal states that this is permitted "*only when other tailings disposal and management options are not environmentally, socially, technically and economically feasible or when deep sea tailings placement systems exhibited the least environmental and social risk*" (DNER Memorandum Order No. 99, Section 19). An Annex to the Philippine Mining Act of 1995 provides for submarine tailings disposal to be considered as an option. There are, however, no examples of operating mines using submarine tailings disposal.

In the **US**, wastewater effluent standards for suspended solids, managed by the USEPA, preclude DSTD. The implementation of these regulations has, however, proved that exemptions are possible where there are no viable alternatives. Two examples, both situated in Alaska, are the A.J. Mine Gold Project near Juneau and the Quartz Hill Molybdenum Project. Neither of these projects became operational.

Box A6 – *contd.*

In **Canada**, the law does not prevent DSTD being proposed, and considered by the authority. The discharge standards in the Metal Mining Liquid Effluent Regulations (MMLER) make it extremely difficult to obtain a permit for this waste disposal option. On the other hand, as with the US, exemptions have been made. The Island Copper Mine and Kitsault Molybdenum Mine (both of which had operated before MMLER). DSTD was considered in 1997 as an option for the Voisey's Bay Nickel Project.

In **Australia**, there is no law that specifically prevents submarine tailing disposal from being considered as an option, if the project conforms with the Australian and New Zealand Environment and Conservation Council's Interim Ocean Disposal Guidelines (December, 1998). There are, however, no cases of proposals (except for the Pasminco Hobart smelter, which was regulated under the provisions of the London Convention: Box A7). The Australian Best Practice Environmental Management in Mining Modules do not include marine tailing placement.

Source: Jones and Jones (2001)

Some international standards and programmes apply to marine disposal of mine wastes, including The London Convention, The Law of the Sea Convention and the Global Programme of Action (see Boxes A7–A9). The application of these instruments to mine wastes is complex, and therefore subject to uncertainty. It has been suggested that DSTD does not contravene the London Convention because it does not apply to pipeline discharges and contains no specific reference to tailing or mine waste (Jones and Jones, 2001). Even where dumping of mine wastes from ships is involved, the applicability of the London Convention is debatable. In principle, The Law of the Sea Convention should strengthen participation in the London Convention and its Protocol, but clearly this has not been the case.

In spite of the apparent lack of preclusion of DSTD in international laws, opinions are divergent on the interpretation. At a recent conference on marine disposal in Manado, Indonesia, it was maintained that "*Submarine Tailings Disposal is illegal in Canada and the USA, has never been proposed in Australia, and violates the spirit of international covenants that protect the marine environment*" (Manado Declaration on Submarine Tailings Disposal).

The World Bank maintains that "*marine discharges of tailings must not have a significant adverse effect on coastal resources*" (World Bank Environment, Health and Safety Guidelines, as cited in Jones and Jones, 2001).

Box A7. The Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, 1972.

The London Convention entered into force in 1975 and by the end of 2001 had been ratified by 78 countries. It regulates the deliberate disposal of wastes at sea by dumping or incineration. This includes territorial waters, but not inland waters. 'Dumping' is defined as disposal occurring from vessels, aircraft, platforms or other man-made structures at sea. Thus, mine wastes are included if they are discharged from a ship, but not from a pipe or fixed structure connected to solid ground.

The Convention bans the disposal of certain materials, including industrial wastes, but this excludes "uncontaminated inert geological materials the chemical constituents of which are unlikely to be released into the marine environment" (Annex I, paragraph 11 e). Such material is subject to a permission procedure. In establishing criteria governing the issue of permits, parties must consider a set of provisions, including the characteristics and composition of the matter, characteristics of the dumping sites, and the method of deposit (Annex III).

Following calls to extend participation in the Convention and improve its environmental standards, a Protocol to the Convention was signed in 1996. The description of what is meant by 'dumping' remains the same in both instruments. A key difference between them is that whereas the Convention itself lists material that is explicitly precluded from dumping, the Protocol does the reverse; stipulating that no material should be dumped except for that which occurs on a list (Annex 1). Inert, inorganic geological is included in the Annex 1, but this material cannot be dumped without a permit. The permit must follow certain criteria (Annex 2). Specific guidelines for the interpretation of the Protocol regarding inert, inorganic geological material were adopted in 2000. The designated authority must specify the basis upon which material is specified as inert and geological. Applicants for permits to deposit this material must demonstrate that they have considered alternative means of disposal or use, otherwise the permitting authority must refuse. The guidelines also cover dump-site selection and the assessment of potential effects.

Although 16 countries had ratified the Protocol by the end of 1996, this number falls short of the 26 required for entry into force. Thus, for the time being, the 1972 London Convention remains the instrument in force for the majority of its signatories.

Box A8. The 1982 United Nations Convention on the Law of the Sea (UNCLOS)

UNCLOS governs all aspects of ocean space, including delineation. It entered into force in 1982 and as of November 2001, had been ratified by 137 States. Part XII of the Convention (articles 192 - 237) addresses the management of the marine environment. Parties are obliged to prevent, reduce and control pollution from land-based sources and pollution by dumping. Pollution is comprehensively defined and dumping is defined in a similar manner to that of the London Convention, namely any deliberate disposal of wastes or other matter from vessels, aircraft, platforms or other man-made structures at sea. Numerous articles apply in principle to marine disposal of mine wastes, although Number 207 is one of the most specific.

- 1. States shall adopt laws and regulations to prevent, reduce and control pollution of the marine environment from land-based sources, including rivers, estuaries, pipelines and outfall structures, taking into account internationally agreed rules, standards and recommended practices and procedures.*
- 2. States shall take other measures as may be necessary to prevent, reduce and control such pollution.*

All States parties to UNCLOS are legally bound to adopt laws and regulations that are no less effective than the global rules and standards (Article 210), which are considered to be those of the London Convention 1972. They will also be obliged to enforce such laws and regulations in accordance with article 216 of UNCLOS. This is significant given that view of the fact that as many as 69 out of 130 States Parties (as of 5 January 1999) are not a Contracting Party to the London Convention 1972.

Box A9. The Global Programme of Action for the Protection of the Marine Environment from Land-Based Activities.

The Global Programme of Action (GPA) for the Protection of the Marine Environment from Land-Based Activities, was adopted by 108 governments following an international conference on this topic in 1995. This acts as a reference point for governments and regional authorities seeking guidance in devising and implementing sustained action to prevent, reduce, control and/or eliminate marine degradation from land-based activities. The GPA is co-ordinated by UNEP, although implementation remains primarily the task of participating Governments. The programme is oriented around seven groups of pollution sources. These include 'heavy metals', and 'physical alterations' but make no specific mention on mine wastes.

4.9 End Use

The intended end use of mine waste facilities should also be taken into account when assessing waste disposal options. Considering possible end use from an early stage of mine planning activity could influence waste management practices and the level of potential environmental and social impacts. An important aspect of mine planning is the rehabilitation of waste disposal sites to a stable and productive post-mining landform, which is suitable