Background

Nautilus Minerals is leading the exploration and development of seafloor copper, gold, silver and zinc resources. Using existing technologies, Nautilus is currently developing the best potential deep-sea site, the high grade Solwara 1 copper-gold project, in Papua New Guinea (PNG). The Solwara 1 site is located 30 km off the coast of New Ireland Province and at 1600 m water depth in the Bismarck Sea.

Development of Solwara 1 will launch a new industry and unlock the vast potential untapped resources of Nautilus’ large mineral rights holdings.

Seafloor massive sulphide (SMS) deposits form on the ocean floor and contain high concentrations of copper, zinc, gold, silver and other trace metals. They are the modern-day equivalents of ancient ‘land based’ volcanogenic massive sulphide (VMS) deposits such as Kidd Creek in Canada. VMS deposits are a major source of the world’s copper, zinc, lead, gold and silver.

The SMS deposits at Solwara 1 are associated with high grade polymetallic sulphide systems, which are particularly rich in copper and gold. Based on drilling results in 2010/11, indicated resources are 1,030,000 t of ore containing 7.2% copper and 5.0 g/t gold and inferred resources are 1,540,000 t of ore containing 8.1% copper and 6.4 g/t gold (results based on a copper equivalent cut-off grade of 2.6%).
With major land based mineralized belts maturing, resource grades dropping and their rate of discovery falling, the corresponding increases in exploration, capital and operating costs makes seafloor mining of high grade SMS deposits a credible commercially viable alternative. The Solwara 1 deposit contains an average copper grade about ten times higher than a typical land based porphyry copper mine and typifies the high grades associated with SMS deposits that make it commercially attractive.

The high grades combined with a relatively small amount of overburden ensure the Solwara 1 Project will have a significantly smaller physical footprint than its land-based counterparts. The proposed extraction area at Solwara 1 comprises just 0.112 km2. In recent years, the boundaries of the existing offshore industries have continued to grow rapidly through offshore technological advancements that have allowed access to new and/or rich resources that 10–15 years ago were considered either technically not feasible or commercially unviable. The offshore oil and gas industry provides no better example of this where all facets of the industry have advanced to enable exploration, construction and production in harsh and deepwater environments.

How it all will work

The offshore production system comprises three main components: the seafloor production tools (SPTs), the riser and lifting system (RALS), and the production support vessel (PSV). Using the SPTs, rock is disaggregated by two large robotic machines that excavate material using a continuous cutting process, not unlike coal or other bulk continuous mining machines on land.

The Auxiliary Cutter (AC) is a preparatory machine that deals with the initial terrain and creates benches for the other machines to work. It will operate on tracks with spud assistance and has a boom-mounted cutting head for flexibility. The second machine, the Bulk Cutter (BC), has higher cutting capacity and will be limited to working benches created by the AC. Both machines leave cut material on the seafloor for collection by the Collecting Machine (CM).

The CM, also a large robotic vehicle, will collect the cut material by drawing it in as seawater slurry with internal pumps and pumping it through a flexible pipe to the RALS. The RALS comprises a large pump and rigid riser pipe hanging from a vessel which delivers the slurry to the surface. The positive displacement pump will be supplied by GE Hydril of Houston, Texas.

On deck of the PSV, the slurry is dewatered by conventional methods. The dewatered solid material is transferred to a transportation barge moored...
alongside the PSV. The return seawater is pumped back to the seafloor through the riser pipes, which also provides hydraulic power to operate the RALS pump. Discharge of the return water close to the seafloor helps to minimize impacts to surface waters.

As SMS deposits have minimal overburden and can be accessed directly from a vessel, seafloor production does not have the high initial land based costs of infrastructure works (roads / accommodation / land clearing) and overburden stripping or decline preparation. Furthermore, the offshore system is mobile so its initial capital outlay is a one off for a system that can be sequentially redeployed to multiple seafloor deposits.

Environmental impact

As the leader of this new industry, Nautilus is setting a high standard for deepwater seafloor mineral resource development by bringing proven practices from the offshore and resource industries. Nautilus worked with independent marine scientists to design and conduct studies to assess and mitigate environmental impacts and to preserve biodiversity and overall ecosystem health and function.

Nautilus completed an Environmental Impact Statement (EIS) following extensive studies conducted over a three-year period. After a comprehensive review of the EIS by an independent international consultant engaged by the Department of Environment and Conservation in PNG, the environmental permit was granted in December 2009. While the international scientific community is largely focused on the impact to the seafloor, the communities of PNG have expressed most concern about the impacts to surface organisms, in particular, pelagic fish such as tuna as well as whales, sharks, turtles and dolphins.

Nautilus has taken a responsible approach to deal with concerns by ‘engineering out’ impacts to surface waters. Nautilus has proposed several strategies to reduce the environmental impact on the seafloor. These strategies were developed with a team of international experts and this leading edge approach to environmental management demonstrates Nautilus’ desire to “do it right” at the dawn of this exciting new industry.

For further information on Nautilus Minerals please visit our website <http://www.nautilusminerals.com>. 