



The SembCorp Marine group's firm commitment to environmental conservation has led to the establishment of two associate companies dedicated to addressing major environmental-related problems in the marine industry. Since the early 1990s, our two associate companies have made in-roads into recycling or treating waste products, namely oil sludge and copper slag, in line with the Singapore government's efforts to preserve the environment.

Oil Sludge Treatment

Associate company Singaport Cleanseas continued to treat slop, sludge and waste products resulting from shipping and ship-repair activities. Singaport Cleanseas had invested in a tanker-sludge treatment plant



on Pulau Sebarok to handle the oily wastes discharged by ships in Singapore. By March 2000, the plant had completed the treatment of a 25-year backlog of sludge from the Port of Singapore Authority in addition to meeting the on-going needs of tanker owners.

Anticipating a decline in the amount of sludge in the coming years, Singaport Cleanseas plans to diversify its business overseas in the areas of sewer rehabilitation and waste treatment.

Also in the area of sludge disposal, our 65-percent-owned Karimun Sembawang Shipyard continued to handle the de-sludging and de-slopping of tanks for vessels stopping by for repairs or travelling along the Straits of Malacca. Supported by the expertise of Singaport Cleanseas, its modern oily-waste management facilities covering an area of 6,000 square metres could treat oily waste without environmental pollution. This expertise had been recognised and fully endorsed by Indonesia's Ministry of Environment for the complete oily waste treatment process.

Copper Slag Recycling

Used copper slag is the largest source of waste from shipyards and refineries. Each year, some 300,000 tonnes are used for abrasive blasting at shipyards, during which the copper slag grit breaks into smaller particles that are contaminated or mixed with rust and paint. Although a non-toxic waste, used copper slag would pose a problem to land-scarce Singapore, which has limited authorised dumping grounds. The Ministry of Environment had since levied a charge of \$67 for every tonne of waste dumped at its landfills.

To address this problem, our associate company JPL Industries was set up in 1990 to pioneer the collection and recycling of copper slag in Singapore. Up until then, there was no process to separate used copper slag from other impurities in Singapore. JPL Industries had turned SembCorp Marine's costly problem of copper-slag disposal into a revenue-generating business and saved an estimated \$12 million each year in production costs at the shipyards.

JPL Industries would collect, recycle, treat and convert copper slag wastes into usable copper slag and other value added products. The treatment plant would act as a collection centre for used copper slag and isolate its contaminants. From there, the treated copper slag would undergo drying and grading at the processing plant.

The recycled copper slag would be reused as an abrasive or as a replacement for sand and aggregate composition or be sent to the company's concrete plant. The concrete plant had been built with a capacity to convert recycled copper slag

into more than 240,000 square metres of bricks each year. These bricks would be sold to government departments, real estate developers, manufacturers and shipyards.



JPL Industries' treatment plant, processing plant and concrete plant had been designed to achieve maximum environmental conservation following the Singapore Ministry of Environment's philosophy of 3R - Recycle, Reuse and Reduce. A rainwater collection system was also incorporated into the plant to collect, treat and reuse rainwater in the treatment process.

