



AEC-NASA TECH BRIEF



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Proposed Gas Generation Assembly Would Recover Deeply Submerged Objects

The problem:

To develop a self-contained gas generation system, to be used for recovery of massive submerged objects from ocean depths, which can be remotely attached to the object to be recovered, has essentially the same specific gravity as sea water to allow use of lightweight supporting cables, provides the required buoyancy quickly, and "breathes" as it approaches the surface in order to equalize pressures and maintain positive buoyancy.

The proposed solution:

Free hydrogen gas is generated by the reaction of an alkali metal, preferably sodium, with sea water. The salvage assembly consists of sea-water-flooded flotation tanks cabled together, containing encapsulated sodium, and carrying remotely activated welding units. The lower ends of the tanks are equipped with relief valves to equalize pressure as the array ascends and hydrostatic pressure diminishes.

How it would be done:

Flooded flotation buoys or tanks, each carrying an encapsulated charge of sodium, are cabled together in an array of sufficient potential displacement to raise the submerged object. Suspended beneath the tank array and cabled to it is a grid of remotely activated attachment welding units of appropriate size and quantity to provide the required attachment strength. Except for the reaction area, the sodium is covered with an inhibitor such as kerosene to prevent violent sodium-water reaction. The assembly is lowered, and when contact is made with the submerged object, the attachment devices are activated from the surface. Remote acting valves in the tanks are then opened and the water in the tanks contacts the sodium. Water

containing the sodium hydroxide reaction product is then displaced from the tanks by the evolved hydrogen, and the assembly rises. The relief valves that provide for pressure equalization must be equipped with check valves to preclude loss of the buoyant gas at the moment of surfacing. Failure to provide such check valves can cause the salvaged object to sink immediately after surfacing. This phenomenon has been witnessed during major salvage operations in the past (the Squalus and the S-51, for example).

Notes:

1. Sandia Corporation report SC-RR-65-380, "Gas-Generation Technique for Recovering Submerged Objects," by C. W. Sprague, contains more information on this conceptual recovery technique, including the effects of air entrapped in the submerged object, hydrostatic pressure and thermodynamic considerations, and mathematical equations that may be used to compute the assembly size and potential displacement necessary to raise a submerged object.
2. Requests for this report and inquiries concerning this innovation may be directed to:

Sandia Office of Industrial Cooperation
Org. 3413
Sandia Corporation
Post Office Box 5800
Albuquerque, New Mexico 87115
Reference: B68-10211

Patent status:

No patent action is contemplated by AEC or NASA.

Source: C. W. Sprague
(SAN-10007)

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