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The Solar Ocean Energy Liaison

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OTEC-1 TAKEN OFF STATION

Despite the outstanding successes evident in early testing of the OTEC-1 Test Facility anchored off the coast of Hawaii (see the March 1981 issue of OE), the US Department of Energy (DOE) pulled the $54 million project off its station in mid-April. OTEC-1, SS Ocean Energy Converter, is now in port on the island of Hawaii awaiting final disposition.

The reasons cited by DOE for shortening this major test project have been that OTEC-1 has already demonstrated all it was designed to do. Casting an estimated $1 million per month to operate, most of which has been for its operating crews, OTEC-1 had the opportunity to test only the first of a series of heat exchangers originally scheduled for exhaustive seawater testing. The high cost of operation was a surprise to a knowledgeable aerospace engineer instrumental in the OTEC-1 project, who said when advised of the monthly cost: "How can it be so expensive? After all, the purpose of relieving Global Marine (the builder) of operating responsibilities was to save money!"

As originally conceived, OTEC-1 was designed to be the medium through which the many heat exchangers tested in detail at Argonne National Laboratories would be performance-tested in seawater so as to arrive at an accurate assessment of heat-transfer efficiencies in an ocean environment. Initially contracted at $25 million, OTEC-1 soared to more than double that amount as the project progressed. DOE blamed Global Marine for cost overruns, while Global Marine complained of DOE's continuously changing contract terms. As a means of resolving the dispute, which reached its greatest heat in May of 1980, cost-cutting measures were effected, including the elimination of a turbine which would produce power.

Described as a "1-megawatt test facility", OTEC-1 never had the opportunity to produce power, much to the disgust of much of the OTEC community. Even without a power-producing turbine, OTEC-1 had been scheduled to operate for up to a year, testing a series of heat exchangers and varied configurations in an actual marine environment for the first time. But only three months' testing was actually completed.

What were demonstrated were heat-transfer efficiencies generally surpassing (continued on Page 4)
(continued from Page 1)

briefly what OTEC is, how it works, and both its US and its worldwide potential as a major energy source.

"OTEC Looking Very Good"

The OEC President began by saying that "OTEC is looking very good. We have made significant progress, and we are well on our way to fulfilling the goals of Public Law 96-310. There are, however, some near-term problems, but in my view these can be surmounted. And as a result the OTEC community will be stronger for having to surmount these obstacles."

Naef's review outlined the success of Mini-OTEC, recent legislation, the Pilot Plant PON and its responses, OTEC-1, the NOAA regulations, the international programs, and finally the energy policy of the Reagan Administration and its implications for OTEC.

As Lockheed's Manager of New Venture Development in Washington, and as an original Director of the OEC, Naef has been at the forefront of OTEC development for many years. He is also the US representative for the United Nations Conference on Renewable Energy. Thus he continues to be one of the best-informed OTEC advocates in the field. His overview of OTEC status today will be included in OE's expanded May issue, which will also be distributed at the 8th Ocean Energy Conference in June.

Following Naef's presentation, the floor was thrown open to discussion. One speaker pointed out that the OTEC community was currently anticipating an annual DOE-funded budget of about $30 million, to be followed the next year by a similar amount, but that three years from now the budget would need to be escalated to "a big chunk of money," primarily for the Pilot Plant—just as the current Administration would be coming up for re-election.

The speaker asked if the private OTEC sector would back the concept of recommending that DOE back out of the long-range program after Phases I and II of the Pilot Plant program. By that time, the speaker suggested, the costs of the Pilot Plant would be more clearly identified, and the licensing procedures and regulations would be firmly in place. This, he felt, would allow off-budget financing at that point, rather than requesting "ten times what we are asking for today". DOE might then be more amenable to continued funding of OTEC at present levels, so that the industry would "walk off on its own" in two or three years. (This was in reference to closed-cycle OTEC development only.)

Jay Yaffo, a Director of the OEC and Managing Director of the Ocean Thermal Corporation, one of nine bidders on the Pilot Plant PON, said he felt that the OTEC community was composed of two groups: one composed of those who believe that US federal funds will be used to build an OTEC plant for demonstration purposes, and one composed of "those of us who don't believe it for a minute". He pointed to the aggressiveness of a Japanese group which is offering to build OTEC plants, primarily in Third World countries, with possible concessions to extract valuable minerals in exchange. He also cited the examples of Japanese efforts in both Guam and Nauru, as well as a scheduled meeting in Hawaii in May between the leaders of that state and Japanese interests regarding OTEC development.

Yaffo asked whether American industry needed "any more incentive than that" to begin to look at OTEC like a business, although he acknowledged that limited continued federal R&D funding would be necessary, along with off-budget financial aid to industry. "We would shrink our numbers; there's no question about that," Yaffo added, "because the people who are traditionally looking for a cost-plus fixed fee will fall out."

In response to a request for more information on OTEC-1, Bob Munier, manager of Tracer Marine's operations aboard the test platform (see the November 1980 issue of OE), told the group that after more than 30 tests on OTEC-1's heat exchangers, they were getting "more than 2% over the design predictions", and that they "had seen no appreciable biofouling to date"—that is, since seawater operations began in mid-December. Munier also pointed out that with OTEC-1's two 1000-HP thrusters, they were able to maneuver the vessel so that the gimbal angles on the CWP were well within safe boundaries—even at one point when 25-foot seas were breaking over the ship's stern. "The CWP tends to act as a terrific sea anchor," he added.

Additional information on OTEC-1 was provided by Norm Sather, head of the OTEC-1 project for Argonne National Laboratories, which has provided technical direction and preparation of the test plans for the test facility. Sather said that OTEC-1 had become a "first-class test facility" in the sense that it has provided an important and very large amount of useful data.

A representative of DOE pointed out that the "start and stop" policies of the Federal Government with respect to OTEC had frequently resulted in young engineers in private industry balking at continued investment of their careers in a field with no consistent federal policy. This problem has been pointed out repeatedly during testimony before Congressional committees, and was a major factor in the passage of Public Law 96-310, which sets long-range national OTEC goals. Unfortunately, new Administrations often do not follow the policies of their predecessors.

Bud Francis, an OEC Director and a principal member of the OTEC team at the Applied Physics Laboratory of Johns Hopkins University, initiated a discussion regarding the possible waiver of the at-risk rules in the case of OTEC investments. Fred Naef added that further examination in this area was needed.
TELESUB 1000, a remotely-operated vehicle (ROV) designed and built by Remote Ocean Systems Incorporated of San Diego, California, conducted a successful inspection operation at the OTEC-1 site off Hawaii. Global Marine Development Incorporated of Newport Beach, California, charged with systems integration and installation of OTEC-1, ordered this inspection prior to start-up.

TELESUB was operated to a depth of 670 meters, which is the full length of the cold-water pipe (CWP) extending below the OTEC-1 platform. In addition to real-time inspection, documentation was provided with videotape records as well as color film obtained with a Remote Ocean Systems XL-5000 documentation camera mounted on the vehicle.

The operation demanded precision control of the vehicle because of high cable entanglement potential and current conditions. TELESUB operators were required to maneuver the ROV close to a cable that was used to guide the cold-water pipe into position. The overall problem was compounded by currents exceeding two knots and sharp current reversals.

(continued from Page 2)

Eric Midboe of Gibbs and Cox was thanked by Naef on behalf of the OEC for implementing this latest meeting. The OEC’s Open Meetings have provided the major forum within the Ocean Energy/OTECS community since the organization’s inception in 1979.

The Ocean Energy Council will sponsor a cocktail party June 8th at the Capital Hilton Hotel following the first day of the forthcoming Ocean Energy Conference in Washington DC.

OCEAN ENERGY 8 IS ALIVE AND WELL!

Shortly after the Reagan Administration took office, an edict was handed down to all Government agencies, including DOE, to reduce or eliminate all “unnecessary” conferences as part of the Reagan cost-cutting program. For a period of about five weeks, there was uncertainty as to whether the forthcoming 8th Ocean Energy Conference would actually take place.

In late March, however, DOE’s Ocean Systems Branch was given the go-ahead for the annual meeting, to be held June 7th through 11th at the Capital Hilton Hotel in Washington DC with the theme “Ocean Energy: Meeting the National Goals”.

The Technical Program Committee has completed its study of the titles and abstracts of the papers offered for the Conference, and the advance program is expected to be mailed in early May.

Full details on the meeting may be obtained from Mr. Richard M. Shamp, Marine Technology Society, 1730 M Street Northwest, Washington DC 20036, (202) 659-3251.

RECORD ROPE LENGTH USED FOR OTEC-1 MOORING

The Department of Energy’s OTEC-1 facility is using what is reported to be the longest continuous length of rope ever produced for its mooring system.

The 2-in-1 braided-nylon rope (914 meters, 41 centimeters in circumference) was manufactured by Samson Ocean Systems Incorporated of Boston for Global Marine Development Incorporated of Irvine, California.

Global Marine designed the mooring system, consisting of three sections of the braided-nylon rope totaling 1189 meters. The volume of rope was so large that it became necessary to braid directly into the van of a large truck. The final weight of the rope was about 11,325 kilograms. A 914-meter-long section was connected to a buoy on the surface and a syntactic buoy near the ocean floor.

Samson Ocean Systems Incorporated also supplied the mooring system used for Mini-OTEC.

THERMOELECTRIC OTEC PLANT STUDIED IN ITALY

The Italian firms of Ansaldo Maccanica Nucaleare (Genoa) and Italmarine (Trieste) are studying the feasibility of a platform-mounted floating thermo-electric power plant. The platform would be anchored off the coast of Italy and linked to shore via underwater cables.

Proponents of the offshore plant claim that the facility would be less polluting, faster, and more economical to build than a land-based unit.

NOAA MOVING RAPIDLY TO IMPLEMENT OTEC REGULATIONS

In reply to a March 16th letter from Frederick R. Naef, President of the Ocean Energy Council, Mr. James P. Walsh, Acting Administrator of the National Oceanic and Atmospheric Administration (NOAA), an agency of the US Department of Commerce, advises that:

The Administration understands the importance of licensing regulations to enable the commencement of a commercial OTEC industry. The proposed OTEC regulations are printed in the March 30, 1981, edition of the Federal Register, and NOAA intends to meet the statutory deadline of August 3, 1981, for issuance of final regulations. This schedule will permit NOAA to receive and begin consideration of the first license applications for commercial OTEC facilities in September 1981.

VIRGIN ISLANDS GOVERNMENT AND AMERADA HESS REACH ACCORD

The ongoing dispute between Leon Hess, chairman of Amerada Hess Corporation, which operates the world’s largest oil refinery on St. Croix, USVI (see the December 1980 issue of OE), and the Virgin Islands Government regarding local taxation of that installation was resolved in late April.

The OTEC Pilot Plant bid for that site involves the co-operation of Amerada Hess, the Islands principal employer. The resolution of the long-standing dispute bodes well for possible privately-financed OTEC plants in the area.


Apr 17: Continued Technical and Scientific Support for the Naval Ocean Research and Development Activity's Acoustic Model Operating System: Negotiations are being conducted with Ocean Data Systems Incorporated, 6000 Executive Boulevard, Rockville, Maryland 20852. Office of Naval Research, 800 North Quincy, Arlington, Virginia 22217.

Apr 17: Investigate Open Boundary Conditions for Primitive-Variable Hydrostatic Ocean Models. Also, Perform Efforts to Extend the Capabilities of the Data-Handling System Developed Under Previous Contracts: Negotiations are being conducted with Science Applications Incorporated, 800 Westpark Drive, McLean, Virginia 22101. Office of Naval Research, 800 North Quincy, Arlington, Virginia 22217.

Apr 20: Analytical Study of Surface Waves in Compliant Coatings: Negotiations are to be conducted with Hydronautics Incorporated, 7210 Pindell School Road, Laurel, Maryland 20810. Office of Naval Research, 800 North Quincy, Arlington, Virginia 22217.

$1.5 MILLION CONTRACT TO SIMPLEX

The Department of Energy has awarded a $1.5 million contract to the Simplex Wire and Cable Company of Portsmouth, New Hampshire for continued research and development of a high-voltage OTEC undersea power-transmission cable. This additional sum brings the total awarded to Simplex to $4 million since the program's onset in 1977.

The manufacture of several full-scale prototype cables by Simplex has been completed. These new riser cables will be subjected to unique environmental conditions. Suspended vertically from depths of 1200 to 1800 meters from the OTEC plant's ocean floor, the cables will experience major mechanical stress.

To compensate for this environmental severity, Simplex plans to devote its efforts to further mechanical and electrical testing, since the range of depths from proposed OTEC plants to the ocean floor will be from 1200 to 1800 meters. The cables are rated at 138 kV.