

**PRODUCTION AND FABRICATION OF VANADIUM ALLOYS  
FOR THE RADIATIVE DIVERTOR PROGRAM OF DIII-D  
— ANNUAL REPORT INPUT FOR 1996**

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V-4Cr-4Ti alloy has been selected for use in the manufacture of a portion of the DIII-D Radiative Divertor (RD) upgrade. The production of a 1200-kg ingot of V-4Cr-4Ti alloy has been completed at Teledyne Wah Chang of Albany, Oregon (TWCA) to provide ~800-kg of applicable product forms, and two billets have been extruded from the ingot. Chemical compositions of the ingot and both extruded billets were acceptable. Material from these billets will be converted into product forms suitable for components of the DIII-D Radiative Divertor structure. Joining of V-4Cr-4Ti alloy has been identified as the most critical fabrication issue for its use in the RD Program, and research into several joining methods for fabrication of the RD components, including resistance seam, friction, and electron beam welding, is continuing. Preliminary trials have been successful in the joining of V-alloy to itself by electron beam, resistance, and friction welding processes and to Inconel 625 by friction welding.