TID/SNA - -2093

AEROJET NUCLEAR SYSTEMS COMPANY
SACRAMENTO, CALIFORNIA

TO: L A Shurley
FROM: D W Tracy
SUBJECT: Results of Delta Weight Calculations between 6061 AA and 7075 AA Pressure Vessel Closures
REFERENCES: (a) ANSC Analysis No. AM-PV-001
Subj: "Stress Analysis of NERVA Pressure Vessel, 1138808 N/C"
(b) WANL Study Layout Drawing No. 981p499

DATE: 24 August 1971
DWT:lm:N8500:M1358

I. INTRODUCTION

This memorandum was prepared to present results of the delta weight calculations between the 6061 AA and 7075 AA pressure vessel closures, performed in fulfillment of Project 620 Work Statement No. 17.

II. SUMMARY

A design layout of a 7075-T73AA pressure vessel closure was prepared and the delta weight calculated between this design and the 6061-T6 AA closure design. The resulting weight reduction for this material change was approximately 95 lbs.

The 6061 AA closure design depicts threaded and seal welded instrumentation ports; inasmuch as, 7075 AA is not weldable, a change in the instrumentation port configuration was required. A conoseal port configuration was incorporated on the 7075 AA layout and resulted in little or no change in closure weight or fabrication difficulty.

III. DISCUSSION

A design layout of a 7075-T73 AA pressure vessel closure has been completed and was incorporated in the latest pressure vessel design layout 1138808B (released for record on 7/26/71 in fulfillment of Work Statement No. 7). Delta weight calculations between this closure and the 6061-T6 closure, shown on the 1138808A layout, was made and a weight reduction of approximately 95 lbs resulted. This decrease in weight is considerably less than the 150 lbs savings that was originally estimated for this material change. The original estimate was based on the assumption that the increase in material allowable from 6061 AA to 7075 AA could be fully realized. However, as described in Reference (a), the closure design in the flange area is based on geometry and not material allowables. Therefore, the weight reduction as calculated from the layouts was less than the original estimate.

DISTRIBUTION OF THIS DOCUMENT UNLIMITED

CLASSIFICATION CATEGORY	
Unclassified	
CLASSIFYING OFFICER	DATE 8/27/71

DISCLAIMER

This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency Thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.

DISCLAIMER

Portions of this document may be illegible in electronic image products. Images are produced from the best available original document.

A stress analysis of the 7075 closure will be completed in March 1972, as scheduled in Project 620, Work Statement No. 9b. This analysis could result in additional weight reduction; however, due to the limited funding available for this analysis and the complexity of a closure analysis orientated toward weight reduction, it is not anticipated that significant weight savings will result. This analysis will result in higher margin of safeties for insert pullout and local bearing under bolt head which were marginal for the 6061 AA closure as reported in Reference (a).

The 6061 AA closure design, to date, has utilized a threaded and welded port concept to receive the WANL instrumentation port adaptor, which provides pass-throughs in the closure for the reactor instrumentation lead wires. A design change in this port configuration was required for the 7075 AA closure as this alloy is not weldable. Two configurations of a port design utilizing a conoseal have been generated and are shown in Reference (b). From the closure design standpoint, either concept is acceptable and the concept selection should be made based on reactor and/or engine assembly considerations.

IV. CONCLUSIONS AND RECOMMENDATIONS

A weight reduction of approximately 95 lbs can be realized by changing the pressure vessel closure material from 6061 AA to 7075 AA, with no significant effect on the fabrication process. Therefore, it is recommended that the prime closure material for the reference design be 7075-T73AA. This recommendation is made on weight and fabrication considerations only, and must be substantiated by analyses scheduled for the near future.

D. W. Tracy

Nozzle, Pressure Vessel Group
Nozzle, Pressure Vessel
and Skirt Department

NOTICE
This report was prepared as an account of work sponsored by the United States Government. Neither the United States nor the United States Energy Research and Development Administration, nor any of their employees, nor any of their contractors, subcontractors, or their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness or usefulness of any information, apparatus, product or process disclosed, or represents that its use would not infringe privately owned rights.

DISTRIBUTION OF THIS DOCUMENT UNLIMITED