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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

NOV 21 2001

Purdue Research Foundation
ATTN: Mr. Thomas B. Wright
1063 Hovde Hall, Purdue University
West Lafayette, IN 47907-1063

Dear Mr. Wright:

SUBJECT: MODIFICATION NO. 7 TO TASK ORDER NO. 1
UNDER CONTRACT NO. NRC-04-97-046

This letter definitizes Modification No. 7 to Task Order No. 1. This modification extends the period of performance, at no additional cost to the Government, through January 15, 2002. Accordingly, the period of performance for Task Order No. 1 is from 09/30/97 through 01/15/02. Also, this task order shall be performed in accordance with the enclosed, modified pages of the Statement of Work that include new, estimated completion dates for Tasks 5 and 16 under this effort.

The Contractor shall not incur costs for this task order which exceed the obligated amount of \$1,493,259. All other terms and conditions, including the ceiling of \$1,493,259, remain unchanged. No FY02 funds are obligated with this modification.

Please indicate your acceptance of Modification No. 7 to Task Order No. 1 by having an official, authorized to bind your organization, execute three (3) copies of this document in the space provided and return two (2) copies to the Contract Specialist, Ms. Amy Siller, at the address listed below. You should retain the third copy for your records.

U.S. Nuclear Regulatory Commission
ADM/DCPM/CMB1, Mail Stop T-7-I-2
Washington, DC 20555

If you have any questions concerning this action, please contact Ms. Siller at (301) 415-6747.

Sincerely,

A handwritten signature in black ink that reads "Robert Weber".

Mary H. Mace, Contracting Officer
Contract Management Branch 1
Division of Contracts and Property Management
Office of Administration

Enclosure:
As stated

NOV 26 2001

ACCEPTED: MODIFICATION NO. 7 TO TASK ORDER NO. 1



NAME

Eric E. Fulkerson
Sr. Contract Manager

TITLE

NOV 28 2001

DATE

Modification (No. 7) to the Statement of Work of Task Order #1, "Interfacial Area Transport," under Contract # NRC-04-97-046 and Job Code W6749, "Thermal-Hydraulic Research"

Additional Work Requirements (12/1/00 - 1/15/02)

This is a no-cost extension to extend the estimated completion dates of the following Tasks 13, 16, and 17 to January 15, 2002.

Task 13. Provide Technical Support

Provide technical support in terms of making presentations, attending meetings, and reviewing technical reports as requested by the NRC Technical Monitor. Provide administrative support including contract modifications and fund transfer to the subcontractors under this contract.

Estimated Level of Effort: 1 staff-month (for this performance period)

Estimated Completion Date: January 15, 2002 (new date)

Task 16. Perform Experiments and Develop Models for Interfacial Area Transport in Horizontal 45° Elbows and in the Vessel Downcomer

This task performs experiments and develops models for interfacial area transport in horizontal 45° elbows (at 2" and 4" ID, respectively) and in a scaled vessel downcomer. These configurations can be found in the prototypical nuclear reactor designs, and the knowledge on two-phase flow regime transition in the configurations is needed for small-break LOCA analyses.

Measurements of interfacial area and void fraction at the inlet and outlet of the configurations will be made. The data will be used to develop correlations for the variation of the interfacial area concentration in the configurations, and they will provide a sufficient database for the interfacial area transport as applied to the constitutive relations for the two-fluid model formulation. Furthermore, flow visualization through transparent test sections will provide information to understand the phenomena of two-phase flow inside the configurations.

45° elbows and a scaled downcomer will be installed onto the existing air-water flow loops available at the University of Wisconsin-Milwaukee. Since the probes for measuring local interfacial area and void fraction for the bubbly, stratified, and plug/slug two-phase flow patterns have already been developed, they will be used in the experiments under this task.

Estimated Level of Effort: 10 staff-months

Estimated Completion Date: January 15, 2002 (new date)

Task 17. Perform Fourth Stage of Experiments in Vertical Pipes

This task performs fourth stage of experiments to measure interfacial area concentrations in the air-water, co-current flow in vertical pipes at 2" and 4" inside diameters (ID), under churn turbulent flow conditions up to the transition region before the formation of the annular flow. Prepare a letter report in both text and electronic format to summarize the test results. Detailed test data will also be prepared electronically in the NRC databank format.

Local parameters of the churn turbulent flow can be acquired by using two four-sensor conductivity probes, each facing opposite direction. This new approach is necessary to take into account the downward motion of recirculating bubbles. Signals from the probes will be processed by the newly developed software for this type of probe application.

[Note that the fourth stage of experiments are complementary to the previously-performed first, second, and third stages of experiments. In the first stage of experiments, data for interfacial area concentrations were obtained in vertical pipes (2" and 4" ID) for bubbly and slug flow and in horizontal pipes (2" and 4" ID) for off-take from a large vessel to horizontal pipes. In the second stage of experiments, data for interfacial area concentrations were obtained in vertical pipes (0.5" and 6" ID) for bubbly and slug flow; data were also obtained in horizontal pipes (2" and 4" ID) to investigate the effects of entrance, elbow, and counter-current flow on interfacial area transport. In the third stage of experiments, data were obtained for bubbly, cap, and limited churn turbulent flow conditions in vertical pipes (0.5", 2", 4", and 6" ID).]

Estimated Level of Effort: 17 staff-months

Estimated Completion Date: January 15, 2002 (new date)