INTERIM REPORT

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INTERIM REPORT

(5)

OPNAV 5216/144 (REV. 6-70)
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DEPARTMENT OF THE NAVY

Memorandum

DATE: June 1979
6390-137M:FJL:ldw

FROM F. J. Loss, NRL Code 6392

TO P. Albrecht, NRC-RSR

SUBJ Monthly Status Report for May 1979

1. FATIGUE CRACK GROWTH

a. 1T Water Pot. Main matrix test, R = 0.2, one min. ramp, one sec. reset, initial K ∿18 ksi √in. (∿20 MPa √m), high Mn-Mo weld metal, Linde 0091 flux. Test status excellent. The data to date (present K ∿20 ksi √in.) are shown in Fig. 1 along with the data from the previous test (Q34-C1) using identical conditions. The agreement is nearly exact to this point.

b. 1T Autoclave. International Cyclic Crack Growth Group round robin test. R = 0.1, one cpm sinewave, initial K ∿25 ksi √in. (∿27.5 MPa √m). This test was initiated at the end of the month and no differentiable data has accumulated at the reporting time.

c. 2/4T Autoclave. Main matrix test, R = 0.2, one min. ramp, one sec. reset, initial K ∿22 ksi √in. (∿24 MPa √m). After the crack had stalled for several weeks, it was restarted using higher loads and higher frequencies. The loads have now been reduced to normal; crack growth is proceeding under normal conditions.

d. Multispecimen Autoclaves

(1) #1. This autoclave is being reloaded with a four specimen daisy chain, main matrix test, one min. ramp, one sec. reset.

(2) #2. Four specimen daisy chain, main matrix test, one min. ramp-one sec. reset, R = 0.7, four materials: A508, A533-B, A106-C, Mn-Mo weld. Test status excellent. Data from the weld specimen, which has the highest initial K values, because of the depth of the notch, is shown in Fig. 1, along with the data from the 1T specimens run at a lower value of load ratio, and a lower temperature. This test is exhibiting the (not unexpected) start-up phenomenon consisting of an acceleration followed by a deceleration and then on to the steady state growth rate.

(3) #3. Three specimen daisy chain, preliminary matrix test, 30 min. ramp, 3 min. hold, R = 0.1. Test continues, status excellent, crack growth rates are slow and, as soon as enough data are available to reliably differentiate, the loads may be raised to move the specimens into a new K range.

2. FRACTURE TOUGHNESS

a. Plans are being made to conduct irradiated 4T-CT tests from the HSST program using the single specimen compliance technique. Orders have been placed for a new furnace and grips for this purpose. Two unirradiated specimens are being shipped from ORNL to be used to demonstrate the experimental technique. However, we are also machining an additional two 4T specimens from another heat of A533-B to be used on the first demonstration tests. These tests are scheduled to be completed prior to 30 July.

b. Testing of 1T-CT specimens in the IAR series is continuing.

c. Planned for June

(1) Modify notch in unirradiated 4T-CT speicmens to accept a clip gage.

(2) Fabricate new clip gage for 4T-CT testing.

(3) Continue testing of IAR specimens.

3. RADIATION SENSITIVITY AND POSTIRRADIATION PROPERTIES RECOVERY

a. IAR Program Operation. Postirradiation decanning operations stand completed for all Phase 1 IAR experiments.

b. IAR Program Materials Assessments. Postirradiation testing of C_v specimens from all Phase 1 experiments stand completed. Preparation of report of findings was continued. Neutron dosimetry results for experiments UBR-18 and UBR-19 have not been received and are causing delays.

c. Decanning of Experiments UBR-23 and UBR-24 containing IAEA reference materials was completed. Testing of C_v specimens from Experiment UBR-23 was initiated.

d. Completed decanning of irradiation/anneal experiment no. 4.

e. Completed construction of Experiment UBR-16 containing A508-2 forging material and commenced reactor irradiation.

f. Completed rolling, heat treatment and flame cutting of base plate material for Phase 2 IAR program welds.

g. Planned for June

(1) Let contract for fabrication of Phase 2 IAR program welds. Commence weld joint preparation for welding.

(2) Continue preparation of report on Phase 1 C_v IAR Program.

(3) Continue irradiation of experiment UBR-26.

(4) Complete postirradiation testing of experiment UBR-23; commence postirradiation testing of experiment UBR-24.

(5) Commence postirradiation testing of irradiation/anneal experiment no. 4.

(6) Commence preparation of specimens from Phase 2 IAR Program base plate.

4. MEETINGS

a. Reviewed Task B on Cyclic Crack Growth for NRC program manager at NRL on 9 May.

b. Attended meetings to prepare a draft test procedure for the J-R using the single specimen compliance technique (14 and 16 May at Silver Spring and Annapolis, respectively).

c. Attended 12th National Fracture Mechanics Symposium at St. Louis (21-23 May 1979).

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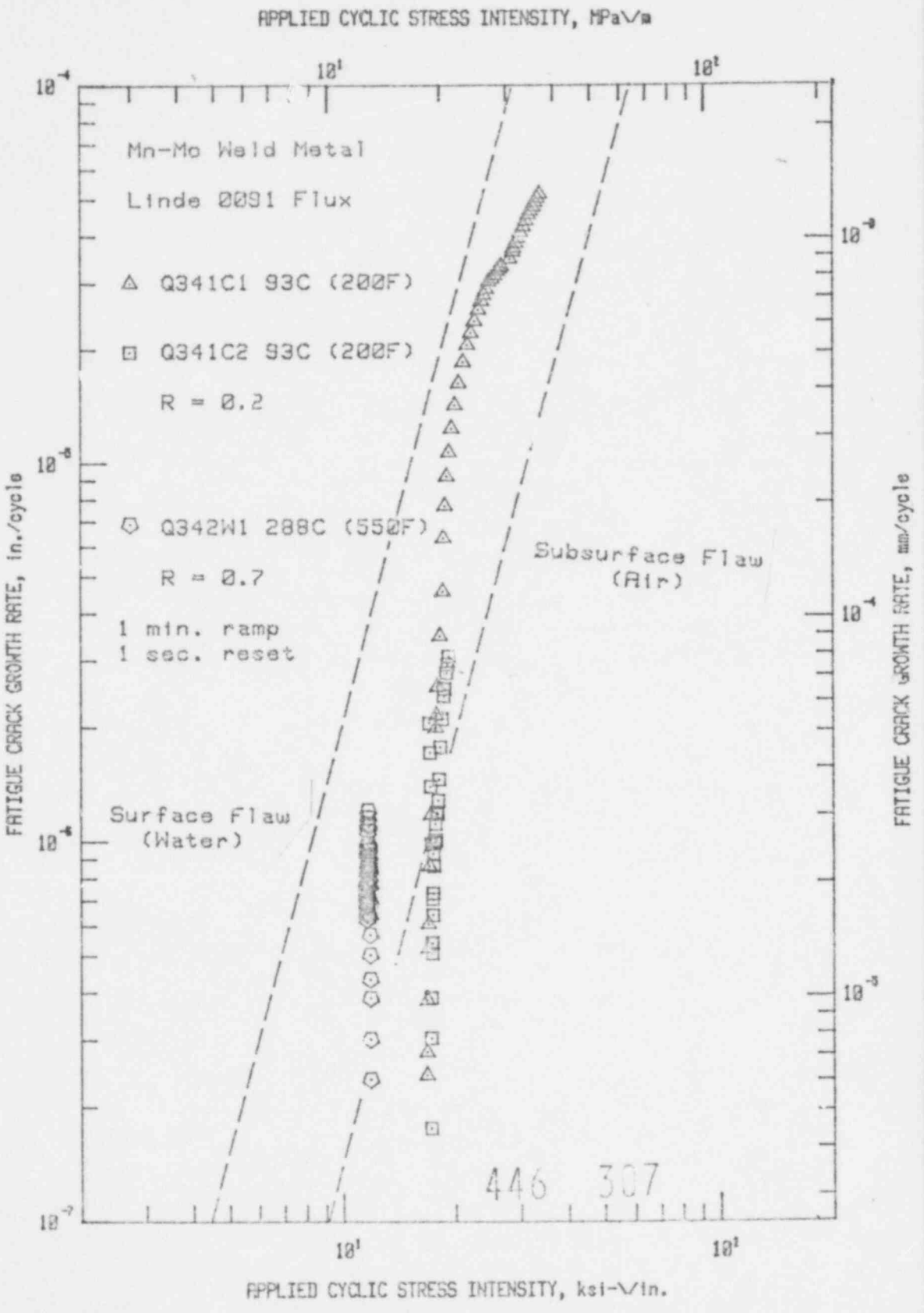

Fig. 1. Fatigue crack growth rates vs applied cyclic stress intensity for high Mn-Mo weld metal, Linde 0091 flux. Test Q341C1 is complete and was reported earlier; the other two tests are in progress.